



CIVIL SERVICES EXAMINATION

**REPORT OF THE
COMMITTEE ON
RECRUITMENT POLICY AND
SELECTION METHODS**

**UNION PUBLIC SERVICE COMMISSION
1976**

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FOREWORD

Since the attainment of Independence, there has been a tremendous expansion of educational opportunities in our country at all levels and the institutions of higher learning have responded quickly to the demand for higher education in humanities, sciences, engineering, medicine and other technical disciplines. On the eve of Independence, we had 3.5 lakh students enrolled in our institutions of higher education and today we have more than 35 lakh. This quantitative expansion has been a sequel to the interaction of several factors operating on our national scene. The authorities in charge of planning the country's development took due cognizance of the need for promoting education as an instrument of social and economic growth. There was also the urge and aspiration of the younger generation in free India to receive higher education as a means of fulfilment of their desire to improve their standard of living and play their due role in the development of the country. The doors of institutions of higher learning were thrown open to all and a large number of citizens belonging to what may be called backward classes made full use of the opportunity. Today, higher education in India does not have the elitist complexion of pre-independence period and a very substantial percentage of the students who come out of the universities and institutes of higher learning are first generation graduates.

The large out-turn of graduates and post-graduates consequent on the massive expansion of our educational system is reflected in the large increase in the number of applications received by the UPSC in recent years for recruitment to the higher civil services and posts. The following figures would give an idea

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about the increase in the number of applications received by the Union Public Service Commission:—

Year	No. of candidates for IAS etc. exami- nation	No. of candidates for all examinations	No. of candidates for selection by interviews
1957-58	8,039	56,956	41,500
1970-71	11,710	69,612	65,197
1975-76	28,538	101,632	68,555

An efficient civil service is one of the essential ingredients of our democratic system and one of the best guarantees for sound and effective administration. In a developing country like ours, the civil service has also the added responsibility of functioning as an instrument of economic growth and social change. Therefore, it has been the constant endeavour of the Commission to so pattern their system of recruitment that the best available talents are located quickly for the posts under the Government. The Commission have all along felt the need for continuously reviewing and improving their techniques of examination and evaluation. The subject of examination and evaluation has already developed into a specialised science. The developments in objective tests and their mechanical evaluation, aptitude and psychometric tests, and individual as well as group task methods require critical examination and evaluation before they are used for selecting personnel for employment under Government. A lot of research work is being carried on in advanced countries in this regard and the results of such research work should be carefully studied before such tests are used in India. Moreover, such methods should be generally acceptable to the student community and enjoy public confidence before they are utilised for recruitment to Government services.

It has been demonstrated through various studies that the reliability of conventional examinations can be greatly increased

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if the questions are properly constructed and the scripts are examined by competent examiners with scientific objectivity. The Commission have been endeavouring for the last few years to bring about a gradual change in their examination system, the purpose being to test not only the candidate's knowledge but also his capacity to analyse and interpret complicated phenomena and apply knowledge to the solution of practical problems. With this end in view, the Commission have been trying to develop the necessary expertise and have set up an Examination Reforms Cell in their secretariat.

In their endeavour to get the right type of persons for various jobs, recruitment to which is entrusted to them, the Commission have felt the need for locating suitable experts in the country, who are in close touch with the latest developments in their respective fields, so as to associate them as advisers and/or examiners. With increasing specialisation in all fields of knowledge, identification of the most suitable persons for assisting the Commission as advisers and examiners has become rather complicated and time-consuming. In order to avoid delay in locating suitable experts for this purpose, the Commission have initiated steps for setting up a computerised Data Bank of specialists in various disciplines and sub-disciplines.

In order to cope with the increasing number of applications for various examinations and selections conducted by the Commission and with a view to ensuring greater accuracy and speed, the Commission have introduced a mechanised system of scrutiny and initiated steps towards computerisation. As a result of the introduction of the mechanised system, the Commission have already succeeded in reducing the time required for determining the eligibility of candidates for various examinations to about six weeks from the closing date of the applications. This would enable the candidates whose applications are accepted to get adequate time for preparing themselves for examinations. In the case of recruitment by interview, the time gap from the

closing date of applications to the date of recommendation has been reduced to about 8 weeks. The Commission would have liked to reduce this time gap further but for the reasons that the candidates have to be given adequate time to apply and those selected for interview have to be given enough time to undertake the travel necessary for appearance before the Interview Board.

According to a Resolution passed by Parliament in December, 1967, all the languages included in the Eighth Schedule to the Constitution and English are to be permitted as alternative media for All India and Central Services Examinations conducted by the UPSC as soon as practicable. While welcoming the policy of allowing the use of Indian languages as the alternative media for their examinations, the Commission, however, were aware of the practical difficulties in its implementation as the regional languages, barring few exceptions, had not been adopted as medium of teaching and examination in the graduate and post-graduate levels by the institutions of higher learning. The commission, however, made a beginning in 1969 by allowing candidates for the combined competitive examination for IAS, IPS and Central Services to use any of the languages included in the Eighth Schedule or English as medium for answering the papers on General Knowledge and Essay. In the same year the Commission also modified the scheme of the IAS etc. examination so as to include an optional paper on the literature of any of the languages included in the Eighth Schedule to the Constitution. Although the Commission have already taken these steps in regard to introduction of languages as media of examination, they are handicapped by the slow pace at which the universities are adopting the languages as medium of instruction as well as examination at the graduate and post-graduate levels. The Commission have felt that the programme for the development of Indian languages need to be strengthened and an adequate number of text-books on various subjects produced in these languages. In this task, the Universities have an important

role to play. The Commission hope that with the publication of a large number of text-books by scholars in respective disciplines and sustained efforts by the various institutions of higher learning to popularise the regional languages, it should be possible for the Commission to extend the use of language media in their examinations on a much larger scale than at present.

While the introduction of the above reforms has received enthusiastic response in academic and administrative circles, the implementation of these reforms has to keep pace with the development of the educational system and administrative structure of the country. The Commission consider that, for this purpose, awareness of the general public of the need for reforms in the techniques of examination, evaluation and assessment and their responsible participation to the extent possible in the process of shaping these reforms, are also very important. It was thus considered necessary by the Commission to set in motion a process by which public opinion could be elicited on the various issues involved and on the pace at which the changes could be introduced. The Commission, therefore, decided in consultation with the Central Government, to constitute a high power Committee consisting of eminent educationists, scientists and administrators who could ascertain public opinion by eliciting answers to a questionnaire as well as by exchanging views with educationists, legislators, students, and civil servants at various stages of their career, and then recommend appropriate measures for further innovations and reforms in examination and selection methods.

I am happy to note that the Committee on Recruitment Policy and Selection Methods, which was set up by the Commission in February 1974, went in great depth and detail into the various aspects of the problems connected with the reform of the existing system of examination and selection and after considerable deliberations submitted its valuable report on March 29, 1976

covering the entire field of Civil Services Examination. The report is now under consideration of the Government and the Commission. Having already taken certain preparatory steps the Commission are in a position to implement expeditiously the reforms as may be finally agreed upon.

On behalf of the Commission as also on my own behalf, I should like to express our grateful thanks to Dr. D. S. Kothari, Shri Bhagwan Sahay, Prof. S. Chakravarty, Shri G. Parthasarathi, Dr. M. L. Dhar and Prof. M. V. Mathur, for the time and attention they have given to study the problems connected with examination and selection methods and recommend the reforms to be carried out in this regard. It is hardly necessary for me to say that these matters are of national importance because they vitally concern the younger generations of our country who are destined to play an important role in the development of future India.

A. R. KIDWAI

Chairman,

Union Public Service Commission.

New Delhi
July 7, 1976

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COMMITTEE ON RECRUITMENT POLICY AND SELECTION METHODS

The Committee on Recruitment Policy and Selection Methods was appointed by the Union Public Service Commission on 6 February, 1974. The terms of reference of the Committee given in the Resolution of the Commission are—

to examine and report on the system of recruitment to the All India and Central Services Class I and Class II followed by the Union Public Service Commission and to recommend such changes in the scheme of examinations and in the selection methods as would give adequate emphasis to knowledge, skills and qualities appropriate to the role and functions of the Services in the context of tasks of national development and reconstruction.

The Committee will deal with the following matters in particular—

- (1) the desirability of having, instead of three examinations, as at present, a single competitive examination for the All India and Class I Services, recruitment to which is made through the IAS etc. Examination*;

*The phrase IAS etc. Examination by usage has come to signify the present scheme of recruitment to the two All India Services : Indian Administrative Service (IAS) and the Indian Police Service (IPS), and the twenty two Central Services—Indian Foreign Service (IFS), Indian Audit and Accounts Service (IAAS), Indian Customs and Central Excise Service (ICES), Indian Defence Accounts Service (IDAS), Indian Income Tax Service (IITS), Indian Ordnance Factories Service (IOFS), Indian Posts and Telegraphs Accounts and Finance Service (IPTAFS), Indian Postal Service (IPS), Indian Railway Accounts Service (IRAS), Indian Railway Traffic Service (IRTS), Military Lands and Cantonments Service (MLCS), Central Secretariat Service and Railway Board Secretariat Service—Section Officers Grade, Indian Foreign Service (Branch B), Armed Forces Headquarters Civil Service, Assistant Civilian Staff Officers Grade, Customs Appraiser's Service, Delhi and Andaman and Nicobar Islands Civil and Police Services, Goa, Daman and Diu Civil and Police Services, and Pondicherry Civil and Police Services.

- (2) the adequacy of the Personality Test prescribed in the present scheme of the IAS etc. Examination;
- (3) the desirability of including more subjects particularly Engineering, Commerce, Agriculture and other technical subjects, and excluding any of the existing subjects, as optional papers in the scheme of the IAS etc. Examination, and of making any other changes in the scheme of the written part of that Examination;
- (4) the number of chances that should be allowed at the IAS etc. Examination;
- (5) the measures necessary to implement the decision of Government about the use of all languages included in the Eighth Schedule to the Constitution, along with English, as media for the IAS etc. Examination;
- (6) the arrangements to be made for review at regular intervals of the syllabi of subjects prescribed for the various examinations to take into account developments as regards courses of study conducted by educational institutions;
- (7) the system of direct recruitment to the Central Services and posts, Class I and Class II, otherwise than through the competitive examinations with particular reference to the measures required to speed up recruitment;
- (8) the feasibility and the procedure to be adopted for bringing down the proportion of candidates to the number of posts to which direct recruitment is required to be made through competitive examinations held by the Commission as well as through selection by interview;
- (9) any special arrangements required in the Commission for efficient handling of recruitment to scientific and technical posts;

- (10) any other matter which in the opinion of the Committee has a bearing on the aforesaid items or which may be referred to the Committee by the Commission.

Later, the Commission referred a few other matters to the Committee. A list is given in Appendix I.

2. At our very first meeting held on 18 March, 1974, it was apparent to us that for proper consideration of the issues referred to the Committee it was necessary to obtain the views of the Ministries and Departments of the Central Government, the State Governments and of knowledgeable and interested persons covering a wide spectrum such as, members of Parliament and State legislatures, members of the services, scientists, sociologists, educationists, teachers and students, and relevant organisations within and outside Government. We obtained their views through a widely circulated Questionnaire and also by personal discussions with many of them. A copy of the Questionnaire is given in Appendix II.

It was most heartening that so many so willingly responded to our questionnaire, and to our request for discussion, and gave us the benefit of their advice and experience. We are grateful to all of them.

3. We visited the Lal Bahadur Shastri National Academy of Administration at Mussoorie where we had discussions with the Director, members of the faculty and trainees. The visit was of great value to us.

4. The present Report deals with recruitment policy and selection methods relating to the Indian Administrative Service, Indian Police Service, Indian Foreign Service and other Central Services. We have discussed in the Report certain aspects of training at the Academy, though this was not specifically included in our terms of reference. We have done so because we are convinced that the final selection of candidates for the various services can be made only after they have undergone a basic

training or Foundation Course for an administrative career and their suitability tested. We consider our recommendations regarding training at the Academy and relating it with the selection process as crucial to the reforms recommended by us.

5. It is a pleasure to record our indebtedness to Professor A. R. Kidwai, Chairman, Union Public Service Commission for the many profitable discussions we had with him.

We are grateful to Shri D. R. Kohli, Secretary of the Committee, and wish to acknowledge his contribution to our deliberations and to the preparation of the Report. It is a pleasure to record our appreciation of the valuable assistance given by Shri S. K. Bose, Under Secretary, to the Committee. He worked with enthusiasm and dedication. We would also like to express our thanks to the Research Officers and other members of the Committee's secretariat.

BHAGWAN SAHAY

S. CHAKRAVARTY

M. L. DHAR

M. V. MATHUR

G. PARTHASARATHI

D. R. KOHLI
(SECRETARY)

D. S. KOTHARI
(CHAIRMAN)

S. K. BOSE
(UNDER SECRETARY)

29 March, 1976.

CHAPTER I

INTRODUCTION AND GENERAL PRINCIPLES

“They (civil services) must think of themselves as part of the people of India cooperating in this great adventure of building up India.”

—Jawaharlal Nehru*

1.1 The role and functions of the country's higher civil services have undergone a profound and fundamental change since Independence. The great adventure of building up of India, which was Jawaharlal Nehru's inspiring and compelling call to the nation over the years, is the establishment and development of a modern state, wedded to the principles of democracy, socialism and secularism. The national objectives are enshrined in the Directive Principles of State Policy of our Constitution. They involve the stupendous task of social transformation by consent, ensuring economic growth with social justice. They embrace many other aspects of national life such as the development of our composite culture, the spread of education, equality of opportunity for all citizens and measures to strengthen our defences to safeguard our independence. It is in this context of free India's ideals and objectives that the importance of the role of the higher civil services has to be viewed. Their preoccupation is no longer the enforcement of law and order and preserving the *status quo*. They have a more vital and positive role to play. They serve a democratic government formed by elected representatives of the people and assist in formulating and implementing large scale measures of national development. They have to attune themselves to the climate of change and help

*From a speech to public servants on December 9, 1955; reproduced in *Jawaharlal Nehru and Public Administration*—Indian Institute of Public Administration, New Delhi (1975).

to translate political programmes into viable statutes and effective administrative acts. Above all, they must accept the totality of the Indian heritage and function without any parochial, linguistic, religious, caste or class prejudice.

1.2 There has been, since Independence an intense and pervasive concern of the State for the improvement of the life of the people and their well being with particular attention to the weaker sections of the community. The traditional tasks of government have expanded vastly in scope and magnitude. And, what is more, many tasks of crucial importance for the country's development and welfare are altogether new to the services. This applies no less to international relations and foreign trade. Developments in science and technology influence increasingly every aspect of our national life, to a degree and extent that has no comparison with the past. Many old paradigms and processes of decision making are no longer applicable in an age of extremely rapid change and innovation. An overwhelming fact is that at the close of the century—twentyfive years from now—the population of the country would be nearing three times that at the time of Independence. This adds an altogether new dimension to the tasks of development and reconstruction which has no parallel in history.

1.3 The tasks and challenges which face the country are so colossal, and demand such close cooperation and interaction between people and government that it is not enough to have merely competent and skilled administrators. Apart from relevant knowledge and skills, which need to be continually renovated, socio-emotional and moral qualities for working *for* and *with* the community are essential. If a public servant lacks the urge and motivation for public service he cannot make an effective contribution. Dedication and willingness to serve the people are as important as professional competence.

Reform of system of recruitment

1.4 A system of recruitment almost totally dependent on assessment of a person's academic knowledge and skills, as

distinct from ability to deal with pressing problems of economic and social development, with people, and with novel situations cannot serve the needs of today, much less of tomorrow. As Professor Laski* said of the quality required of civil servants in the United Kingdom, "The issue is the acquisition of those habits of mind which, in a period of rapid change, are capable of going back without fear to the foundations of tradition and being able, in the light of their examination, to see the full significance of the need for innovation." We venture to suggest that our recruitment procedures should be such that we can select candidates who can not only assimilate knowledge and sift material to understand the ramifications of a situation or a problem but have the potential to develop an original or innovative approach to the solution of problems.

1.5 We shall now turn to another important aspect of recruitment policy. With a view to equalise opportunities for ~~different~~ sections of the community, there is great need to expand the base of recruitment. Promising students in many universities do not seem to be aware of the opportunities of public service open to them and of the great and dynamic role of the civil services in the development of the country and in shaping its future. There may be others who may not be able to take the examinations because of lack of means. To widen the base of recruitment would require effort at many levels and by many agencies. The part of the University Grants Commission as also of the universities in this respect is of utmost importance, not to mention the role of State Governments. A more positive and imaginative publicity by the Union Public Service Commission would pay good dividends.

1.6 There is a need to pay greater attention to Indian languages in the scheme of the UPSC examinations. Numeracy and ability to deal with quantitative aspects of problems also needs to be emphasised.

*"Parliamentary Government in England"—By Harold J. Laski.

1.7 A reform of the whole system of recruitment is called for. The need is immediate. We are, by our terms of reference, concerned mainly in this Report with recruitment policy and selection methods. But we have also dealt to some extent with the subject of training, and have drawn attention to the extreme urgency and importance of improving its content and standard. Recruitment cannot be treated or left in isolation. Recruitment and training, as also deployment, are closely interdependent, each one influencing the structure and outcome of the others.

The aim and endeavour of a selection process is to identify persons of outstanding ability and potential. Their development depends largely on training, and their value and contribution to tasks of national development depend on proper deployment. We have come to the conclusion that the one reform which would pay the largest dividend is to treat recruitment and training as parts of one continuous process. We shall refer to this subject later.

Recruitment Methods—a brief survey

1.8 The present annual recruitment to the All India and non-technical Central Services, Class I exceeds 500 which is about ten times the number before Independence. The strength of the Indian Administrative Service is nearly 4000, of the Indian Foreign Service 544, and the total for the other Services exceeds 12000.

1.9 A striking, indeed an astonishing, fact about the present method of recruitment is that it is essentially little different from what was introduced more than a hundred years ago by the British following the recommendations of the Northcote-Trevelyan Report for the British Civil Service and the Macaulay Report for the Indian Civil Service. The big issue before these Committees was of patronage which permeated the entire civil service at the time. The entry was at such an early age that there was little opportunity of testing a person's character and competency for the job. The Reports recommended that candidates for the civil service should have received university education and be selected by a competitive examination in academic subjects of a

honours degree standard. Until recently the Northcote-Trevelyan concepts continued to dominate the recruitment and organisation of the civil service in the UK. The Fulton Report (1966--68) on the Civil Service begins with the statement : "The Home Civil Service today is still fundamentally the product of the nineteenth century philosophy of the Northcote-Trevelyan Report (1854). The tasks it faces are those of the second half of the twentieth century. This is what we have found, it is what we seek to remedy". A major innovation of the Fulton Report is the concept of an 'unified civil service' in place of its rigid compartmentalization into various separate services.

1.10 The system of selection for the civil service now in use in the UK is fundamentally different from the pre-war system. It is called *Method II* to distinguish it from the earlier method, now referred to as *Method I*. It may be recalled that the Administrative Reforms Commission recommended that a part of the recruitment to the IAS and other services may be made "on the lines of what is known as Method II examination" as an experimental measure. We have gone into this question. We do not regard Method II (or its equivalent) as feasible or particularly advantageous for us. Apart from practical difficulties, because of the large numbers we have to deal with, Method II has an element of 'subjectivity' on the part of the examiners too great in our view to be acceptable. The success or failure of a candidate is determined entirely by the results of an interview before a Selection Board. Any selection method in which a written examination is not a major component is not likely to inspire public confidence in the context of a wide variation in university standards and of the educational and social background of candidates, not to speak of wide diversity of languages. However, there are certain important features of Method II which are of direct interest with regard to the system of selection recommended by us. The aim of Method II, ideally, is an assessment of overall intellectual and personal qualities. On the other hand, Method I was almost entirely a test of knowledge and intellectual ability as assessable by a university type of examination. Description of Method II is given at Appendix III.

1.11 A selection method which relies heavily on an academic examination is faced with a major difficulty arising from the very extensive spectrum, and specialisation of university courses and disciplines. This is far more serious today than in the past because of the rapidly accelerating growth of knowledge. In consequence most disciplines, especially scientific, tend to proliferate and each subject of study tends to become several in the course of a few decades.

1.12 When the number of optional subjects is very large—and added to this the number of candidates for many of these subjects very small—it is hardly possible to achieve any reasonably uniform standard of competitive marking over such a wide range of diverse subjects. Under such conditions the examination can no longer be conceived as one single examination. It splits into several examinations, as it were, and fails to serve its competitive purpose. It is important to ensure that in a competitive examination the number of candidates appearing in any paper is not too small (unless it is necessary for other compelling considerations). When the number is too small, the sample ceases to be representative of the population, and it becomes difficult to mark scripts with a degree of discrimination adequate for close competition.*

1.13 As against increasing specialization of university courses, it also needs to be remembered that persons joining the services should have the breadth of interest and ability to acquire new knowledge and skills not directly related to their university specialization. In a world of rapid change it is a definite advantage—even a necessity—that the services have persons drawn from a wide spectrum of academic subjects and background. We have, therefore, to arrive at a balance, between somewhat conflicting factors. The list of optional subjects should be neither so restricted as to discourage promising candidates from taking the examination nor too large to seriously affect uniformity of standards. Generally speaking, subjects

*As a rule of thumb the number of candidates for any one paper should exceed $10 \times N/n$, where N is the total number competing and n the number to be selected.

which are of a highly specialised character or which are likely to be offered by only a very limited number of candidates should not be included in the list. The list should also take into account new developments in education.

1.14 A single paper in a subject at the bachelors (honours) or masters level is totally inadequate. It cannot be representative of the wide coverage of the subject, and as such would adversely affect the reliability of the examination. We would prefer four papers in a subject, but two papers is the minimum. It is interesting to note that in the list of optional subjects for the UK Civil Service Examination (Method I) there were six papers for most of the optional subjects. (In History there were 20 papers : Greek History-1, Roman History-1, European History-6, British History-4, Scottish History-2, Welsh History-2, History of the United States-1, British Economic History-2, World Economic History-1). A candidate had to offer in all seven optional papers.*

*The total number of optional papers provided for Method I was about 150. Even so it was very inadequate to cover the diversity of university courses pursued by likely candidates for the civil service.

The Macaulay list of 1854, considered fully adequate at the time, had only 13 subjects and of these 9 were language subjects. They were—

English language and literature

Composition	500	Greek	750
History	500	Latin	750
General Literature	500	French	375
		German	375
	1500	Italian	375
		Mathematics Pure & Mixed	1000
		Natural Sciences	500
		Moral Sciences	500
		Sanskrit	375
		Arabic	375
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The Macaulay Report says: "It seems to us probable, that of the 6,875 marks, which are the maximum, no candidate will even obtain half."

And the Report adds that it is their belief that the "Intellectual Test . . . will be found in practice to be also the best moral test that can be devised." That might have been so according to Victorian values and when education was highly selective. Its validity today is questionable.

1.15 In our system of recruitment to the civil services (non-technical) candidates are not required to possess, at the time of recruitment, any special knowledge or skills directly relevant to government administration and management. (The same obtains in the UK system of selections). Any such restrictions would keep out many otherwise promising candidates. It would affect adversely the base of recruitment. There are, however, systems which, as a prerequisite, demand a high degree of professional knowledge. Perhaps the best known example of this is the French System.

1.16 In the French System* candidates compete for entry into the Ecole Nationale d' Administration (National School of Administration). They take an admission examination in five basic subjects : administration, public law, economics, social and international problems, and finance, and an essay paper. The examination is of a high standard. Only candidates who have done honours level courses in universities in these or allied subjects would have any chance of success. Successful candidates receive training at the National School of Administration for about two and a half years. The training at the School is a combination of general and special courses. There is a great emphasis on "practical lessons and lessons learned from experience". The special courses are organised under four sections intended respectively for general administrators, economic and financial administrators, social administrators, and diplomats. In all sections the training is both multidisciplinary and intensive. Whether a candidate is selected for appointment to a service or not is entirely dependent upon the person's performance at the School.

Comprehensive method of selection

1.17 Selection methods may be broadly divided without too much oversimplification into two categories : (a) academic and

*We are indebted to Dr. Pierre Racine, formerly Director of National School of Administration, for his note on the French System of recruitment, prepared at the request of Shri G. Parthasarathi. The note is reproduced at Appendix IV.

(b) comprehensive. There are, of course, intermediate gradations. In the first case, the aim basically is to test knowledge and mental qualities—rather the part which is testable by academic examination of the university type. Whereas in the second case, despite great diversity amongst methods under this category, the aim is to make an overall assessment of intellectual and personal qualities, appropriate to the relevant services. The method currently used by the Union Public Service Commission is an example of the former: the UK Method II of the latter. The academic methods are traditional and have undergone little change. In post-war years they have been under severe criticism in regard to their validity and general appeal, because of the explosive increase in knowledge and number of university courses, and an increasing awareness and concern about examination errors.

1.18 The comprehensive methods are relatively new. A very large amount of research effort has gone into their development. They have a great potential for further improvement. Organised industry use, almost everywhere, comprehensive methods for their recruitment. These methods are much more difficult technically and organisationally, take much more time, and are more expensive. From the point of view of the role and functions of the civil services today the case for the comprehensive method is very strong. The immense tasks of development and reconstruction impose on a public servant the need for continual learning of new knowledge and skills: a sort of continuing self-renewal. Unless a person is intellectually outstanding and temperamentally and motivationally suitable for the service to which he is appointed, he is unlikely to make the contribution expected of him. For a person to give his best to a service, he must belong to the service not only intellectually but also emotionally. The person and the service must be compatible in every way.

1.19 We propose that the present method of selection be replaced by a comprehensive method taking into account our special requirements and conditions. The new method that we

envisage is a combination of tests for the assessment of knowledge, and intellectual and personal attributes of candidates competing for entry into the higher civil services of our country. A test for intellectual ability alone cannot be regarded as adequate.

The essential feature of the proposed method is the involvement of the National Academy of Administration with the process of recruitment. The performance in the 'Foundation Course' of trainees at the Academy should be taken into account in the process of selection. The allocation of candidates to different services should be made not at the beginning but on completion of the reorganised Foundation Course on the lines indicated in a later Chapter.

1.20 We recommend that recruitment to the All India and Central Services (Class I) should be made on the basis of a unified scheme of examination common to all the services. We shall refer to it as the *Civil Services Examination* scheme (CSE scheme).

The proposed scheme consists of three sequential stages, each making a significant and specific contribution to the total process. These are—

Civil Services—Preliminary Examination (objective type)—to serve as a screening test for the next stage.

Civil Services—Main Examination (Written and Interview)—to determine entry to the Academy.

Civil Services—Post Training Test—to be conducted by the Union Public Service Commission on completion of the Foundation Course to assess personal qualities and attributes relevant to the civil services.

1.21 The selection process should be so designed that it attracts as many deserving candidates as possible from different parts of the country to compete in the examinations. A

continuing effort in this direction by the Union Public Service Commission is necessary. The proposed Preliminary Examination is one step in that direction. The examination should be held at a large number of centres widely dispersed throughout the country. It would thus serve both to expand the base of recruitment and at the same time act as a filter or sieve to prevent overloading of the Main Examination by candidates with little chance of success. The Preliminary Examination should be simple to administer and the evaluation of answer books should be rapid and precise. The examination should be, therefore, of the objective type. We strongly recommend that candidates from weaker sections of the community, who qualify at this examination, should be provided with special counselling and guidance by the universities, and financial assistance by the State Governments to compete for the Main Examination.

1.22 A selection process consisting of sequential stages, one following the other, is necessary, apart from any other reason, because of the large number of candidates. The average quality of candidates would get "richer" as the stream proceeds from one stage to the next. It would also become more homogeneous. A selection process divided into a sequence of stages would make it possible to concentrate the available testing resources on credible candidates likely to make the grade instead of dispersing them sparsely on a very large number of candidates many of whom are of indifferent quality. A sequence of stages would improve considerably the efficiency of the process and also make it more economical.

1.23 We recommend that on the basis of an academic examination and interview test (which would partly also be a test of personality) candidates be selected for joining the Academy. They should not at this stage be assigned, provisionally or otherwise, to any particular service or groups of services. That should be done after they have completed a "Foundation Course" at the Academy, as described later. Allocation of candidates to individual services before the

completion of the entire selection process in the proposed scheme would be definitely harmful. It has been observed that the present practice of allocating candidates to different services before they join the Foundation Course, has not only no advantage, but leads to unhealthy rivalry and complexes.

1.24 It may be argued that the extension of the period of selection—a kind of extended interview as it were, may make recruitment less attractive to some high calibre candidates. In this connection it may be noted that nearly 90 per cent of candidates appearing at the All India and Central Services examination compete for all the services. Amongst the candidates recommended for appointment to the IAS and IFS, only about 10 per cent compete for these two services alone and nearly all of them have already been selected for one or the other service at the same examination held earlier.

1.25 We feel that the Post Training Test at the end of the Foundation Course will be more favourable to candidates belonging to weaker sections of the community since during the course itself there will be opportunities for them for self improvement. We regard this as an important aspect of the scheme.

1.26 It is not possible to have a process of selection which will be completely free of error or of 'wrong' selection but the margin of error can be substantially reduced if the selection is dependent not on any single process but on a combination of a number of processes each with its own method of merit evaluation. If one of the these processes provides for evaluation on the basis of the close observation of each candidate over a fairly long period under conditions in which merits or defects are clearly brought out, the quality of the selection is enhanced, and for that reason its general acceptability is also increased.

1.27 For the determination of the final ranking of candidates, the relative weightage given to the Main Examination and the Post Training Test (at the end of the Foundation Course) should

be 70 : 30, that is, the Post Training Test would carry 30 per cent of the total marks for the CS Examination. To begin with, however, the relative weightage of the Post Training Test may be fixed at about 15 per cent, which may be raised over a period of 5 years to 30 per cent. This would allow sufficient time for the reorganisation and development of the Academy.

1.28 It should, of course, be mentioned that a selection procedure does not result in a clear cut separation between "better" and "lesser" qualified candidates because of random and systematic errors which are an inevitable accompaniment of all systems of examinations whether written or oral. It is always possible to conceive that someone, who is eliminated, if the examination system were impeccable, would succeed. It is also equally possible that someone who is undeserving gets selected. These two tendencies generally go in opposite directions. When the number competing for a fixed small number of places is large, a selection procedure can be devised which would ensure that the chances of an "undeserving" candidate getting through are negligible. But this can be achieved only at the cost of a sizable number of candidates as good as those selected*being left out. A few amongst those rejected may be even better than some of those selected. What is important to recognise is that this cannot be helped. This is inescapable.

A test is designed to separate candidates into 'better qualified' and 'less qualified', better qualified are those who have done better at the examination. Whether they would also make better officers in their service career is a different matter. This would depend upon the degree of correspondence between the characteristics measured by the examination and the attributes and qualities which would go to make a successful officer. This is usually referred to as the validity of an examination, and its estimate is not easy. It needs a detailed study of job performance and the qualities appropriate to tasks performed by the various services. The value of such a study cannot be overemphasised.

Medium of Examination

1.29 There are two related questions pertinent to the scheme of the Civil Services Examination (recommended by us in Chapter 3) as also in a large measure to all the examinations with which we are concerned. These are—

option to candidates with regard to papers offered for an examination, and

choice of medium (language) in which papers may be answered.

1.30 A significant component of the present examinations (written) is test of knowledge and comprehension of the academic subjects which a candidate chooses from a prescribed list. If the choice of subjects available to candidates is not reasonably wide, it is likely to discourage some otherwise deserving candidates from taking the examinations. But this poses a serious problem of intercomparison of candidates with very different combinations of subjects.

1.31 In the determination of the ranking of candidates, marks in one subject make exactly the same contribution as marks in any other subject. For example, 70 per cent marks in Mathematics obtained by one candidate, 70 per cent in History by another, and the same percentage in Hindi by a third, have precisely the same value in terms of the competitive test, though the mental calibre of the candidates may be quite different. In fact, there is little justification that identical marks in widely different subjects should be given identical weightage. There is also the related problem that a given increment of marks in a paper makes the same contribution to the selection process irrespective of whether it is at the bottom or the top end of the scale of marks. For example, a difference in marks between 30 and 40 per cent counts exactly the same as the difference between 85 and 95 per cent. But any departure from the present practice would be even less justifiable or acceptable.

1.32 There is a possible alternative. The competitive examination could consist of compulsory papers only (identical papers for all candidates) without any optional papers. A compulsory paper should not, of course, contain too many optional questions, otherwise it would be a collection of optional papers rather than an obligatory paper in its true sense. The compulsory papers could be in subjects relevant to national development, modern administration and management. Facilities for the study of such subjects are at present severely limited. We would not recommend, in the prevailing situation an examination based entirely or very largely, on compulsory papers. That would drastically reduce the base for recruitment. The scheme of examination has to be an appropriate mix of compulsory papers and optional subject papers. The compulsory papers should pay increasingly more attention to testing knowledge of problems—economic, social, scientific and industrial, facing the country, of its developmental plans and of its culture and history. The scheme recommended in Chapter 3 is an important step in that direction. The style of question papers also requires a major change. There should be greater emphasis on testing candidates' powers of analytical and critical thinking, comprehension of fundamentals, and application of knowledge to meet national needs.

1.33 We now come to the question of the medium of examinations. At present, Eighth Schedule languages besides English are permitted as medium of the IAS etc. Examination for the Essay and General Knowledge papers. About 20 per cent of the candidates for the examinations write their Essays in Indian languages. Amongst those successful the percentage is nearly five. For the General Knowledge paper the corresponding percentages are about half of those for the Essay paper (*see* Table on next page).

Indian Administrative Service etc. Examination (1970—74)

Option of language medium for Essay and General Knowledge papers

Medium	Essay					General Knowledge				
	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974
Number of candidates appeared										
English	5656	6376	6935	10544	11518	6002	6776	7570	11393	12628
Assamese	6	4	8	4	2	3	4	5	2	1
Bengali	84	91	90	130	167	46	54	46	51	77
Gujarati	23	28	34	58	27	20	27	33	43	26
Hindi	791	932	1148	1556	1917	458	539	648	746	896
Kannada	3	10	9	11	15	2	8	6	7	8
Kashmiri	1	—	2	4	2	—	—	—	1	1
Malayalam	17	18	16	25	38	12	12	10	17	21
Marathi	27	30	23	34	50	17	21	18	24	38
Oriya	12	15	16	17	25	8	6	9	8	12
Punjabi	40	57	57	96	113	24	30	21	46	45
Sanskrit	1	—	1	—	—	1	—	1	—	—
Sindhi (Devanagri)	—	—	—	1	—	—	—	—	—	—
Sindhi	1	2	2	4	1	1	2	1	4	—
Tamil	29	27	47	56	76	24	17	30	40	50
Telugu	14	10	20	29	41	9	6	17	19	27
Urdu	19	19	16	41	32	8	12	9	11	17
Total	6724	7619	8424	12610	14024	6635	7514	8424	12412	13847
Percentage of total number using Indian languages.	15.88	16.31	17.68	16.39	17.87	9.54	9.82	10.14	8.21	8.80

1.34 The subject papers are required to be answered in English. Candidates do not have an option to answer these papers in Indian languages. This restriction is disadvantageous to those who have studied their university courses through the medium of Indian languages. The proportion of such students is rapidly increasing. For instance, in the Delhi University—which has been contributing the largest number of successful candidates for the All India and Central Services during recent years—the number of non-science students taking *honours* degree examinations with Hindi medium was 18 per cent of the total appearing in History in 1974. The corresponding figures for Economics and Political Science were 12 per cent and 37 per cent respectively. Further, the trend over the last few years has been for these percentages to increase.

1.35 We recommend that the choice of the medium of examination, now available for the Essay and General Knowledge papers, should also be extended to subject papers. This is desirable educationally as well as from the point of view of equality of opportunity to eligible candidates.

1.36 How to ensure a uniform standard of the marking of the answer books in different languages is not an easy problem. But it is not intractable. (This is not unlike the problem of intercomparison of marks in different subjects). As a large proportion of answer books would be in English, at any rate for many years to come, these could serve as a kind of *norm* or comparison standard for answer books in other languages. If in any particular language the distribution of marks for answer books—the mean and standard deviation—differ greatly from those for answer books in English, statistical adjustments could be made, if considered necessary by the board of examiners (described below). The evaluation of answer books would need, of course, much more time and attention than it commonly receives today.

1.37 It is sometimes suggested that answers in Indian languages may be translated into English by professional

translators to reduce all the answers to a supposed common basis for evaluation. It is obvious that the style and substance of a candidate's answer cannot be properly reflected in a translation. Besides, the quality of translation would vary widely in translating a large number of scripts. Translation is, therefore, not an appropriate remedy. Several universities permit at the undergraduate, and also at the postgraduate level option of the medium of examination. All the scripts are evaluated in the original.

1.38 We have elsewhere pointed out that an examination, however, carefully organised, suffers inevitably from what is termed "examination variability". For instance, if an examiner were to reassess an answer book, it is quite unlikely that the new marks would be the same as the marks assigned at the first marking. The variation in marking, as several studies in our country and elsewhere have shown, is inescapable. It can be of the order of several per cent. Answers of the same "merit", all in one medium (say English), are not likely to get the same marks, how-so-conscientious or proficient an examiner may be. The marks may be markedly different—specially when the answer books, because of their large number, are distributed amongst several examiners. The question of intercomparison of answer books in different languages appears in a somewhat more realistic perspective, when seen in the context of the "errors" which are an inevitable accompaniment of all examinations. What is important is to avoid systematic errors. By systematic errors we mean the tendency of an examiner to uniformly mark high or low answers in one language as compared to answers in another language. The effect of systematic errors can be reduced by providing a board of examiners, which should lay down on the basis of discussion, detailed guidelines and norms for evaluation of answers. It is desirable that, as far as possible, there are on the board at least two examiners to evaluate answers in any given language. It is possible to substantially improve the objectivity of the examination with such a board of examiners and by the adoption of statistical tests and checks.

1.39 In this connection we would like to draw attention to the present practice being followed by the Commission. We understand that with a view to improve the accuracy of marking of scripts, the Commission convenes a meeting of the examiners for such subjects where there is more than one examiner. At this meeting, the scope of each question, as also the range of possible answers and their relative merits, are discussed. They also carry out a sample evaluation of the scripts in the light of their discussion in order to ensure uniformity in the standard of marking among examiners to the maximum possible extent.

In the present scheme of the IAS etc. Examination candidates are allowed option to use any one of the Schedule Eight languages for answering papers for General Knowledge and the Essay. For the scripts in Schedule Eight languages the Commission generally appoints examiners who can assess the scripts in English as well as in one of the Schedule Eight languages. The examiner assesses first the scripts in English and this assessment serves as a kind of norm for marking scripts in other languages.

Basic requirements for selection

1.40 A selection process or method used by the Union Public Service Commission should satisfy in our view certain basic requirements. These are—

- (i) It should command the complete confidence and trust of candidates, of the Government and the public generally. Integrity is of the utmost importance. No effort should be spared to ensure that the process does not in any way favour, or discriminate against, any region, group or section of the community.
- (ii) It should provide to the maximum possible extent equality of opportunity to promising candidates in respect of the assessment of relevant intellectual and personal qualities, and attributes motivation, irrespective of social status, region, and their university degree subjects.

- (iii) It should be such as would encourage candidates with appropriate attributes and qualities to offer themselves for selection. Any special preparation required for the examinations/tests should be such as would be generally useful whether a candidate is selected or not.

Deliberate effort should be made by the Commission to widen continually the base of recruitment with special attention to deserving candidates belonging to the weaker sections of the community. This would also help to raise the general standard of recruitment, and make the services truly representative of the country.

- (iv) Candidates should have option to choose any of the *Eighth Schedule languages* or *English* for the medium of the UPSC examinations (written).

Sound knowledge of at least one Indian language, preferably of two languages, should be an essential requirement for the Civil Services Examination. English is a most important medium for acquisition of new knowledge and skills in a fast changing world. There should be a test for proficiency in English.

- (v) The various tests of knowledge, skill and personality should make full use of new developments/techniques in the methods of assessment. Each part of the selection process should make a significant contribution towards the final selection.

More than ordinary care is necessary with regard to the appointment of examiners and interviewers. They should be outstanding in their respective fields. It would be desirable that full information/orientation regarding technical aspects of the written examination/interview is provided to them. In this connection 'practice interviews' and

the use of tape recordings of typical interviews may be found useful.

- (vi) It should be clearly recognised that there are certain essential qualities which defy description in words but which a "good judge of men" can usually assess with a fair degree of reliability*. This is the tacit part of the selection process. An interview by a competent board is an indispensable element of the selection process considered here.
- (vii) The method should be under continuous review and evaluation, continuing improvement in the light of experience and new developments is essential. This should take into account advancement of knowledge and developments in the universities. An important matter which deserves careful examination by the Commission is about "*scaling of marks*" for different papers using appropriate statistical techniques. This is a widely recognised procedure for improving the reliability of examination as a tool of the selection process.

1.41 A Research Unit, competently staffed, is necessary for the work of the Commission and for the improvement of selection methods. The Unit should have a high professional standing in the country. Its services would be available also to the State Commissions and other interested agencies. Further, there should be a continuing review, by the Commission and the Personnel Department, of the standard of recruitment for the various services, using appropriate indices and statistical methods.

*It may be observed that the statistical correlation between marks of candidates in written papers and interview test for the IAS etc. Examination is negligible. For example, for the 1974 examination, the correlation coefficient between written papers and interview marks in the case of candidates selected for the IAS and IFS was 0.082. For the top 20 per cent it was 0.6, for the bottom 20 per cent 0.01. This indicates that the written papers and Interview Test have supplementary roles in the selection process.

With expanding education and increasing intensity of competition, a general rise in the standard is to be expected. If there is a noticeable lowering of standards, special steps should be taken by the Union Public Service Commission, and where necessary by the Government, to remedy the situation. Also steps should be taken to promote the dissemination of relevant information, visits to universities and colleges by members and senior staff of the Commission, the opening of more examination centres, and in other ways—to widen the base of recruitment, without lowering standards, so that large sections of the community and parts of the country which are at present under represented in the higher services have a more balanced representation.

Women candidates

1.42 The number of women candidates successful at the IAS etc. Examination in the years immediately following Independence was altogether negligible (Table 2.3 of Chapter 2). Now it exceeds ten per cent. For the IAS it was 16 per cent in 1974 and 21 per cent in 1973*. It also appears that women candidates have been doing twice as well as men in terms of numbers taking the examination and those selected. This is a very remarkable and welcome development. Perhaps the most significant factor has been, following Independence, the new awakening and sense of self assurance among women students.

Scheduled Castes and Scheduled Tribes candidates

1.43 It is rather disconcerting that the difference between average marks of all candidates successful at the IAS etc. Examination and the average marks of Scheduled Castes/Scheduled Tribes candidates has shown no noticeable improvement. It was 228 in 1960, 148 in 1965, 164 in 1971 and 183 in 1974. The subject merits detailed study by sociologists and educationists.

*The figure for the Home Civil Service in the U K is nearly 25 per cent.

Standing Advisory Committee

1.44 There are several important aspects of the work of the Commission for which it would be a distinct advantage to have a Standing Advisory Committee appointed by the Commission. The advice of the Committee would be of great value regarding policy and action on questions of examination reform, which is in many respects a continuing process, personality test, expansion of the base of recruitment and improvement in the opportunities open to promising candidates belonging to backward communities and areas. Such a Committee could meet two or three times a year. The Chairman of the Commission should be the Chairman of the Committee, and members, about 15, should be drawn from universities, industry, and public life. The term of membership should be three years, a third of the members retiring every year.

New scheme—phased programme

1.45 The implementation of the CSE scheme would require a great deal of preparatory work, including reorganisation of the National Academy of Administration. We recommend that the scheme be implemented in two phases. The first phase should consist of the Preliminary Examination and the Main Examination. The recruitment commencing from 1977 should be on the basis of these examinations. The allocation of successful candidates to the various services should be made, as at present, on the results of the Main Examination (as described in Chapter 3). The second phase would include linking of performance at the Academy with the selection process. We think that it should be possible to implement the full scheme by 1980.

To conclude : It will be appreciated from what we have said in this Chapter that the new tasks and challenges faced by the civil services call for a major change in the recruitment policy and selection methods. Two factors are especially important in this connection, and these have largely influenced most of our recommendations in the Report. Firstly, the selection process

should be made increasingly more comprehensive. Besides testing relevant knowledge, mental qualities and skills, there should also be an assessment of personal attributes, identification with the community and motivation to serve it. Secondly, increasingly greater attention should be paid towards equalisation of opportunities for entry into the civil services. There should be a deliberate effort to attract meritorious candidates from weaker sections of the community, and also from areas other than big metropolitan cities, to take advantage of the Commission's competitive examinations. A much greater spread of educational and social background amongst entrants than at present would be highly desirable for the effectiveness of the services and for improving communication between the services and the people.

A broad distinction could be made between opportunities for educational development and opportunities for employment. Whereas improvement of facilities for educational advancement is linked with national policies and plans for education, the Commission has a responsibility towards promoting equalisation of opportunities as regards accessibility to its competitive selections. We believe that the recommendations in the Report would make possible a more reliable assessment of the mental and personal attributes of candidates, and also contribute significantly towards equalisation of opportunities for promising candidates to compete for entry into the civil services. The new syllabus for the compulsory and optional papers, inclusion of Agriculture, Commerce, Management, and Engineering in the list of optional subjects; greater emphasis in question papers on application of knowledge to problems of rural and urban development; introduction of a Preliminary Examination to be held at a large number of widely dispersed centres; provision for educational guidance and assistance by universities and State Governments to deserving candidates qualifying at the Preliminary Examination; the place given to Indian languages in the examinations; and the proposed connection between the final selection and training are steps in that direction.

CHAPTER 2

RECRUITMENT TO ALL INDIA AND CENTRAL SERVICES : BRIEF HISTORY AND PRESENT POSITION

2.1 Under the terms of reference of the Committee we have to examine the system of recruitment to the Indian Administrative Service, Indian Foreign Service, Indian Police Service and non-technical Central Services. The specific issues relating to the IAS etc. Examination held by the Union Public Service Commission are—

the desirability of having instead of three examinations as at present, a single competitive examination,

the adequacy of the Personality Test in the scheme of the examination,

the desirability of including more subjects particularly technical subjects and excluding any of the existing subjects as optional subjects in the scheme of the examination and of making any other changes in the scheme of the written part of the examination,

the number of chances to be allowed at the examination, and

measures necessary to implement the decision of Government about the use of all languages included in the Eighth Schedule to the Constitution, along with English, as media for examination.

Present scheme of examination—brief history

2.2 For providing the necessary background for the Chapters to follow, we shall briefly describe the scheme of the examination at present and the changes made therein from time

to time since its inception. We shall also set forth statistical information regarding the number of candidates competing and successful at the examination including women and Scheduled Castes and Scheduled Tribes candidates, the economic background of successful candidates and their subjectwise and universitywise distribution.

2.3 Before Independence, separate examinations for the Indian Civil Service were held every year both in England and India. A combined examination was held in India for a number of Central Services—Indian Audit and Accounts Service, Imperial Customs Service, Indian Railway and Accounts Service, Military Accounts Department, Postal Superintendents (Class II) Service and Transportation (Traffic) and Commercial Departments of the Superior Revenue Establishment of State Railways. There was a separate examination for the Indian Police.

2.4 Prior to 1922, the Indian Civil Service Examination was held only in England by the British Civil Service Commission. From that year the examination was also held in India. Four years later the newly formed Public Service Commission (India), began to conduct the ICS examination in India on behalf of the British Civil Service Commission. This position continued until 1937 when the Public Service Commission (India) was replaced by the Federal Public Service Commission under the Government of India Act 1935. Thereafter, the Indian Civil Service Examination in India was held by the Federal Public Service Commission independent of the British Civil Service Commission. After 1943, recruitment to the Indian Civil Service was suspended. Recruitment was also suspended to the Indian Police and the Indian Audit and Accounts Service and allied services.

2.5 After Independence, recruitment to the Indian Civil Service and the Indian Police was not resumed but new services known as the Indian Administrative Service and the Indian Police Service were established as All India Services. Another

service—Indian Foreign Service—was established to meet the country's requirement for diplomatic personnel. The Commission was redesignated as the Union Public Service Commission in 1950, when the Constitution came into force.

2.6 A combined examination was introduced in 1947 for recruitment to the Indian Administrative Service, Indian Police Service and non-technical Central Services. (However, in the case of the IPS the number of optional subjects required to be offered by candidates were two as against three for candidates competing for the other services.) In the following paragraphs, an account is given chronologically of the changes which have been effected in the scheme of the examination from time to time.

2.7 Between the years 1947 and 1950, a combined competitive examination was held once a year, for recruitment to the IAS, IFS, IPS and non-technical Central Services. Eligibility age initially fixed at 21 to 26 years was reduced in 1948 to 21 to 25 years. In the following year the age range was further reduced to 21 to 24 years, except for the Indian Railway Traffic Service for which it continued to be 21 to 25 years. There was no restriction on the number of attempts allowed to a candidate.

For the examination, candidates were required to take three compulsory subjects, General English, Essay and General Knowledge each carrying 150 marks. Candidates for the IAS, IFS and the Central Services were required to take three optional subjects and those competing for the IPS only two optional subjects*. The syllabi for the optional subjects were of the honours degree level. There was one paper carrying 200 marks for each subject. Total marks for the written test were 1050 for the IAS, IFS and other Central Services and for the IPS the total was 850 marks. *Viva Voce* carried 300 marks for all the services.

*Optional subjects prescribed from time to time are listed at Appendix V.

Two additional optional subjects, approximating to the masters degree standard, were prescribed from 1951 onwards for the IAS and IFS. Also, from the same year, maximum marks for the *Viva Voce* for these two services were raised to 400.

2.8 The lower age limit for the IPS was reduced to 20 years in 1951 and the upper age limit for the Indian Railway Traffic Service was reduced to 24 in 1955. The age limits for all other services remained at 21 to 24. In the 1952 examination *Viva Voce* was renamed Personality Test, as it was sought to assess the total personality of the candidates at the interviews.

2.9 The Public Services (Qualification for Recruitment) Committee, appointed by the Government of India in 1955, observed that the age range of 21 to 24 years for the IAS, IFS and other Central Services permitted candidates to take three chances at this examination. The Committee felt that this was excessive and tended to encourage the entry of mediocre candidates into the services. They recommended that in order to identify the best candidates the number of attempts at the combined examination should be limited to two by reducing the age range to 21 to 23 years. The Government accepted the recommendation regarding restriction of the number of attempts to two, but provided that these were to be counted separately for the following categories of services—

Category I—IAS and IFS.

Category II—IPS and Police Service Class II of the Union Territories.

Category III—Central Services Class I and Class II.

The prescribed age limits of 20/21 to 24 years was not altered. From 1961 onwards, the IAS etc. Examination became in effect three examinations. Since the restriction on the number of chances was related not to the examination as a whole but to individual categories, theoretically, a candidate could now take as many chances as the age limits would permit. In effect,

therefore, the new modification did not restrict the number of attempts that a candidate could make at the examination. It is, however, interesting to note that of those successful at the examination, for about 80 per cent it was either the first or the second attempt and for about 15 per cent it was the third attempt at the examination.

2.10 In 1964 the maximum marks for the Personality Test were reduced from 400 to 300 for the IAS and from 300 to 200 for the IPS and the Central Services. The maximum marks for IFS were retained at 400. The present structure of the IAS etc. Examination is given in Table 2.1.

TABLE 2.1
IAS ETC. EXAMINATION

Conditions of Eligibility	IAS	IFS	IPS	CS
(1) Age limits (years)	21—26	21—26	20—26	21—26
(2) Minimum Educational qualification	.....First degree (any faculty).....			
(3) Number of permissible attempts	.....Not more than 3 chances for each category*			
Scheme of Examination				
Written Examination				
Compulsory subjects—3				
(General English 150, General Knowledge 150, Essay 150 marks)	450	450	450	450
Optional subjects (Each subject carries 200 marks)	3 × 200=600	3 × 200=600	2 × 200=400	3 × 200=600
Additional subjects (Each subject carries 200 marks)	2 × 200=400	2 × 200=400	—	—
Personality Test	300	400	200	200
Percentage of Personality Test marks to aggregate	17.14	21.62	19.04	16.00
Grand total of marks	1750	1850	1050	1250

*Category I —IAS and IFS.

Category II —IPS and Class II Police Service of Union Territories.

Category III —Central Services Class I and Class II.

NOTE:—Each subject is covered in one paper. Optional subjects are of honours level, and additional subjects of masters level.

2.11 In 1969, as a first step towards the introduction of Indian languages as the media of examination, candidates were given the option to use the Indian languages included in the Eighth Schedule to the Constitution, besides English, as media of examination for the compulsory subjects of Essay and General Knowledge.

2.12 In 1972, the upper age limit for the examination was raised to 26 years following the recommendation of the Administrative Reforms Commission. The other related recommendation of the Administrative Reforms Commission that no candidate be permitted to appear at the examination more than twice was not implemented. In fact, since 1973, candidates are permitted to make three attempts for each of the three categories of services within the permissible age range.

Applicants for the examination

2.13 The number of persons who applied for and appeared at the IAS etc. Examination during the years 1950--75, is given below :—

TABLE 2.2
RECRUITMENT BY IAS ETC. EXAMINATION (1950—75)

Year	Number of applicants	Number of candidates actually appeared	Number of candidates recommended for appointment	Percentage of Column 4 to Column 3
1	2	3	4	5
1950	3647	2797	240	8.58
1951	4219	3233	231	7.15
1952	4427	3341	232	6.94
1953	5063	3582	199	5.55
1954	6627	4471	186	4.16
1955	6659	4451	340	7.49
1956	7568	5015	371	7.40
1957	8039	5245	305	5.82
1958	9766	6327	265	4.19
1959	11010	6572	286	4.35
1960	10376	5873	333	5.67
1961	9182	5659	372	6.57

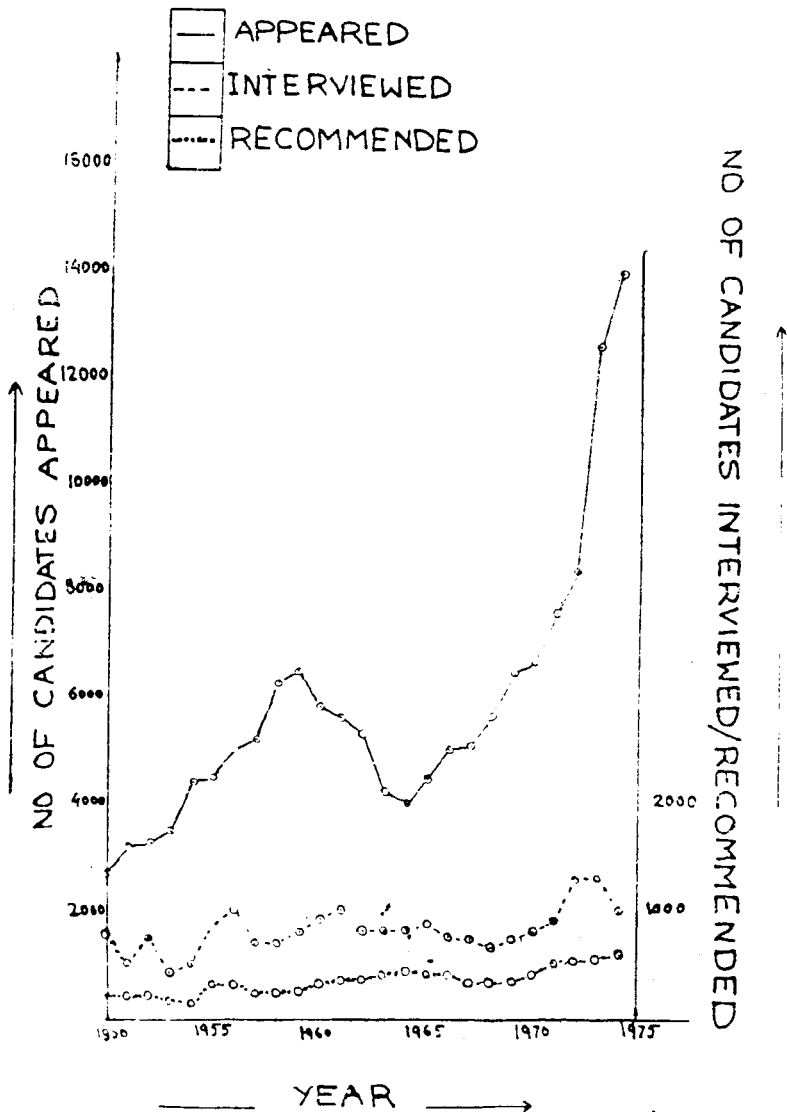
1.	2	3	4	5
1962 . . .	8432	5391	374	6.94
1963 . . .	7113	4282	417	9.74
1964 . . .	6414	4005	468	11.68
1965 . . .	7152	4501	426	9.46
1966 . . .	8305	5040	426	8.45
1967 . . .	8312	5165	346	6.70
1968 . . .	9726	5706	354	6.20
1969 . . .	11302	6516	378	5.80
1970 . . .	11710	6730	428	6.36
1971 . . .	13538	7632	542	7.10
1972 . . .	17684	8424	549	6.52
1973 . . .	21032	12623	591	4.68
1974 . . .	24423	14048	611	4.35
1975 . . .	28538	15509	Result not declared.	

The numbers have been rising except for the years 1960 to 1964 when there was a sudden decline*. No definite reasons can be assigned to explain this phenomenon. A detailed study would be desirable. It is likely that the decline was due to the psychological impact of the introduction of restriction on the number of chances from 1961, withdrawal from 1963 of the age concession which was formerly allowed to certain categories of Government servants, and withdrawal of the age concession for displaced persons from 1964. The number of applicants for the 1975 examination is 28538—more than eight times the number of applicants at the 1950 examination.

2.14 The number of women candidates at the examination has also been increasing, but the number appearing is still not very significant: it has not exceeded 8 per cent of the total number of candidates. The number of women recommended for appointment in recent years has been ranging between 11 and 13 per cent of the total number recommended. It is noteworthy that women candidates have shown a high level of performance. At the examinations held in 1972 and 1974, women candidates topped the list and at the 1973 examination, 8 of the first 20 positions in the list of successful candidates for the IAS were taken by women candidates. The Table 2.3

*There was a comparable fall in the applicants for the Assistants Grade Examination also.

I A.S. ETC. EXAMINATION 1950-1974.



gives the total number of candidates appeared, total number of women candidates appeared, total number of candidates recommended and total number of women candidates recommended on the results of the examinations held in 1951, 1955, 1960, 1965 and 1970 to 1974 :—

TABLE 2.3
IAS ETC. EXAMINATION

Women candidates: Appeared and Recommended

Year	Appeared at Examination			Recommended for appointment		
	All	Women	Women percentage	All	Women	Women percentage
1951 .	3233	—	—	231	4	1.73
1955 .	4541	—	—	340	6	1.76
1960 .	5873	132	2.25	333	5	1.50
1965 .	4501	160	3.55	426	24	5.63
1970 .	6730	454	6.75	428	50	11.68
1971 .	7632	597	7.82	542	67	12.36
1972 .	8424	624	7.41	549	64	11.66
1973 .	12623	988	7.83	591	75	12.69
1974 .	14048	952	6.78	611	69	11.29

2.15 The Reports of the Union Public Service Commission indicate that the number of Scheduled Castes and Scheduled Tribes candidates applying for admission to the examination has increased steadily over the years. The number of Scheduled Castes candidates which was 1057 in 1963 rose to 4060 in 1974. Similarly, the figure in respect of Scheduled Tribes candidates registered an increase during these years from 221 to 965. Further, on the results of the examinations held since 1963, the Union Public Service Commission were able to recommend candidates belonging to these categories for appointment against all the vacancies reserved for them year after year except for the examinations held in 1971, 1972, 1973 and 1974 when the number of Scheduled Tribes candidates recommended by the Commission fell short of the vacancies reserved for them. In 1972, as against 56 vacancies reserved for Scheduled Tribes, only 41 could be recommended for appointment. Similarly, in

1973 only 30 Scheduled Tribes candidates were recommended against 56 vacancies and in 1974, 50 candidates were recommended against 74 reserved vacancies. (The percentage of reserved vacancies has been raised since 1970, to 15 per cent for Scheduled Castes and $7\frac{1}{2}$ per cent for Scheduled Tribes candidates).

Background of the successful candidates

2.16 A study of the economic status of the parents of the successful candidates appointed to the IAS over the period 1948 to 1960, conducted by the National Academy of Administration, Mussoorie revealed that over the period from 1948 to 1960, 8.9 per cent of the candidates belonged to the low income group—income below Rs. 300 p.m. and those in the high income group—income over Rs. 800 per month—were 32.9 per cent. According to another study made by the Union Public Service Commission, the percentage of candidates belonging to the low income group—income not exceeding Rs. 7200 per annum recommended for appointment to the IAS and IFS on the results of the 1972 examination was 52.48 per cent. The percentage of those in the high income group—income exceeding Rs. 18000 per annum was 17.02 per cent. Corresponding figures for the 1973 examination were, 34.84 per cent for the low income group and 25.81 per cent for the high income group. Similarly figures for the 1974 examination were for lower income group—33.70 per cent—income not exceeding Rs. 8000 per annum; and for the higher income group 14.93 per cent—income exceeding Rs. 24000 per annum. The figures of lower income group for 1973 and 1974 indicate a large change from the corresponding figure for 1972 but we have to await further data before any conclusion can be drawn as to whether, it represents a definite trend or is a chance effect.

2.17 Studies have also been made regarding the rural background of the candidates from time to time. The criterion regarding the determination of background has, however, varied

in respect of different studies. It would, therefore, not be possible to draw any inference from these studies. The percentage of candidates recommended to the IAS and IFS with rural background was about 21 per cent during 1948 to 1960 and about 26 per cent during 1972 to 1974.

2.18 Studies have also been made on the university background of candidates selected for the IAS. The distribution of IAS Probationers according to universities from which they obtained their first degree, selected on the basis of examinations held from 1948 to 1960, indicated that most of the probationers came from a limited number of universities—Madras 27.1 per cent, Delhi 12 per cent, Allahabad 10.4 per cent, Punjab 8.9 per cent and Bombay 5.7 per cent. Recent results of the IAS etc. Examinations also indicate a similar trend. (Table 2.4).

TABLE 2.4 .
IAS ETC. EXAMINATIONS
All Services (all candidates)

			1972	1973	1974
<i>Total recommended</i>			549	591	611
University	Number recommended	University	Number recommended	University	Number recommended
1	2	3	4	5	6
Delhi	114	Delhi	122	Delhi	121
Punjab	50	Punjab	81	Punjab	58
Allahabad	47	Allahabad	57	Allahabad	45
Madras	39	Calcutta	37	Calcutta	39
Calcutta	29	Madras	28	Rajasthan	28
Total	279	Total	325	Total	291
Percentage of candidates from five universities to the total recommended					
50.82		54.99		47.63	

2.19 Subjectwise distribution of general candidates recommended for appointment to the IAS and IFS on the results of the examinations held in 1972, 1973 and 1974, together with the arithmetic mean and standard deviation of marks obtained by them in various subjects are given in Appendix VI. It would be seen that the subjects of British History, European History, Indian History, Physics, Political Science and English Literature have been very popular with the candidates.

2.20 The vacancies in 1974 in the various services recruitment to which is normally made on the results of the IAS etc. Examination together with their latest available cadre strength is given in Table 2.5.

TABLE 2.5

Services	Number of vacancies	Cadre strength
	(1974)	
Indian Administrative Service	130	37 94
Indian Foreign Service	25	544
Indian Police Service	88	2150
Indian Audit and Accounts Service	12	804
Indian Customs and Central Excise Service	40	752
Indian Defence Accounts Service	10	219
Indian Income-tax Service (Class I)	80	1984
Indian Ordnance Factories Service	10	953*
Indian Postal Service	6	324
Indian Posts & Telegraphs Accounts and Finance Service	6	96
Indian Railway Accounts Service	15	459
Indian Railway Traffic Service	24	790
Military Lands and Cantonments Service, Class I	4	93

*Includes both technical and non-technical categories.

CHAPTER 3

CIVIL SERVICES EXAMINATION : PROPOSED SCHEME

3.1 We have already described in Chapter 1 the general principles which form the basis of the proposed scheme of the Civil Services Examination for recruitment to the following All India and Central Services

Indian Administrative Service.

Indian Foreign Service.

Indian Police Service.

Indian Audit and Accounts Service.

Indian Customs and Central Excise Service.

Indian Defence Accounts Service.

Indian Income-tax Service (Class I).

Indian Ordnance Factories Service, Class I.
(Assistant Managers—Non-technical).

Indian Postal Service.

Indian Posts & Telegraphs Accounts and Finance Service.

Indian Railway Accounts Service.

Indian Railway Traffic Service and

Military Lands and Cantonments Service, Class I.

We shall first describe the salient features of the new scheme. A discussion of the recommendations will follow.

Salient features of the new scheme

3.2 The new scheme, which is common for all services, aims at comprehensive assessment of knowledge and skills, and relevant intellectual and personal attributes of candidates offering for entry into the All India and Central Services. It envisages involvement of the National Academy of Administration in the process of selection at the final stage.

In this new scheme, special emphasis is being placed on testing the knowledge of the candidates regarding the country and its people, history of the freedom struggle, problems and challenges facing the country, development plans, and impact of science and technology. Besides a paper in English, every candidate will take a paper in one of the Indian languages included in the Eighth Schedule to the Constitution. Major changes have been made in the list of optional subjects. Subjects such as Agriculture, Engineering, Management, and Commerce have been added. Candidates will have the option to answer papers either in English or in any one of the Eighth Schedule languages.

A new feature of the proposed scheme is the introduction of a Preliminary Examination (objective type) to be conducted at a large number of centres dispersed throughout the country. This would serve to widen the base of recruitment and provide a primary screening test for the identification of the more serious candidates offering for the examination. Such a screening test is necessary to prevent overloading of the selection process by a large number of indifferent candidates which undermines seriously the efficiency and reliability of the process itself. It is in the interest of candidates, as also in the national interest, that those who have little chance of making the grade know about it at an early stage of the selection process. This would help them to use their time, energy and resources more gainfully in preparing for careers better suited to their interests and abilities. Candidates from the weaker sections of the community qualifying at the Preliminary Examination could be provided with facilities to prepare for the later stages of selection.

3.3 The new scheme consists of three successive stages. These stages are—

One—*Civil Services Preliminary Examination* (Objective Type) for the selection of candidates for the Main Examination,

Two—*Civil Services Main Examination* (Written and Interview) to select candidates for entry to the Academy, and

Three—*Civil Services Post Training Test* at the end of the Foundation Course at the Academy.

The result of the stage three test, combined with the result of the Main Examination (stage two), would determine the ranking of candidates and their allocation to various services.

3.4 The Preliminary Examination (stage one) and the Main Examination (stage two) are closely linked. Together they constitute the first phase of the proposed reform. This phase is self-contained. It can be implemented without simultaneously introducing the third stage. Introduction of the third stage is expected to take more time because it would involve reorganisation of the National Academy of Administration. For the interim period allocation of the successful candidates to the various services will be determined by the marks obtained at the Main Examination as at present. We recommend that the first phase be introduced from the 1977 examination.

3.5 The number of candidates admitted to the Main Examination should be about ten times the total number of vacancies to be filled in a year in the All India and Central Services. This should determine the standard of the Preliminary Examination. Since the candidates would be permitted two attempts at the Main Examination, the number qualifying in a year, on the basis of the Preliminary Examination, should be five times the number of vacancies, averaged, say over the past three years. This number should be mentioned in the annual notification of the examination. This number would be subject to suitable addition of Scheduled Castes and Scheduled Tribes candidates, to ensure that their number is not less than five times the reserved vacancies.

Since the Preliminary Examination is meant to serve as a screening test only, the marks obtained at this examination would have no other function or weightage in the selection process.

3.6 A candidate should be not less than 21 years of age and not more than 26 years on 1st July (or on any other date to be prescribed by the Union Public Service Commission for the purpose) of the year in which he appears at the examination, with the usual relaxation of the upper age limit for Scheduled Castes and Scheduled Tribes candidates and other categories as may be notified by the Government from time to time.

3.7 Candidates (including those belonging to Scheduled Castes and Scheduled Tribes) will be permitted only two attempts for the Preliminary Examination and two for the Main Examination.

3.8 The minimum educational qualification for appearing at the Main Examination will be a university degree. Candidates may, however, be permitted to take the Preliminary Examination while studying for their degree. We consider this specially necessary for engineering and other professional students as the first degree course in their case extends over a period of five years. We feel that it would be convenient and desirable that this relaxation may be given to all categories of students rather than have separate admission rules for the Preliminary Examination for different categories of students. No student will, however, be admitted to the Main Examination unless he has taken his university degree and has qualified at the Preliminary Examination.*

3.9 We shall now proceed to describe the Preliminary Examination, the Main Examination and the Post Training Test at the end of the Foundation Course.

Civil Services—Preliminary Examination

3.10 The question papers will be of the objective type. Question papers other than those for Indian languages will be

*Candidates qualifying at the Preliminary Examination can take the Main Examination in any year within the prescribed age limits.

set in English. The syllabus prescribed for the optional subjects would be covered in two papers. All papers would be of two hours duration.

The examination will consist of the following five papers :—

Paper I—Indian Language—to be selected by the candidate from the languages included in the Eighth Schedule to the Constitution—	300 marks
Paper II—English Language	—300 marks
Paper III—General Studies	—300 marks
Papers IV & V—One subject covered in two papers from the list of optional subjects.	—300 marks for each paper.

List of Optional subjects

Agriculture
 Botany
 Chemistry
 Commerce
 Economics
 Engineering (Civil, Electrical or Mechanical)
 Geography
 Geology
 Indian History
 Law
 Mathematics
 Philosophy
 Physics
 Political Science
 Psychology
 Sociology
 Zoology.

Civil Services—Main Examination

3.11 The examination will consist of written papers (2700 marks) and Interview (300 marks).

Candidates will have the option to answer the papers, except the Language papers, in any of the languages included in the Eighth Schedule to the Constitution, and in English. Question papers other than the Language papers will be set in English. All papers will be of three hours duration.

The *written examination* will consist of the following papers—

Paper I—Any one of the languages of the candidate's choice from the list of languages included in the Eighth Schedule to the Constitution.	—300 marks
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Paper II—English	—300 marks
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Paper III—Essay	—300 marks
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Papers IV & V—General Studies	—300 marks for each paper.
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Papers VI,
VII, VIII

and IX—Candidates will offer two subjects out of the list of optional subjects. There will be two papers for each subject—	300 marks for each paper.
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List of Optional subjects

Agriculture
Botany
Chemistry
Commerce
Economics
Engineering (Civil, Electrical or Mechanical)

Geography
 Geology
 History
 International Relations
 Law

Literature of one of the following languages---

Assamese, Bengali, Gujarati, Hindi, Kannada, Kashmiri, Marathi, Malayalam, Oriya, Punjabi, Sanskrit, Sindhi, Tamil, Telugu, Urdu, Arabic, Persian, German, French, Russian and English.

Management
 Mathematics
 Philosophy
 Political Science
 Physics
 Psychology
 Public Administration
 Sociology
 Zoology

V.B.—Following combinations of two subjects will not be permissible

Political Science and Public Administration;

Political Science and International Relations;

Commerce and Management; and Public Administration and Management.

Interview Test

3.12 The number of candidates to be invited on the basis of the results of the written papers to appear before the Interview Board of the Union Public Service Commission will be about twice the number of vacancies to be filled. If this number does not include candidates of the Scheduled Castes and Scheduled Tribes equal to twice the number of reserved vacancies, the Commission may invite an additional number of such candidates for interview by the Board.

The interview will carry 300 marks.

Civil Services Post Training Test at the end of the Foundation Course at the Academy

3.13 The candidates selected on the basis of the Civil Services Main Examination (Written and Interview) will be admitted to the National Academy of Administration for a Foundation Course of about a year. At this stage they will not be allocated to the various services. The Foundation Course will include six to eight weeks of field work. At the end of the Foundation Course the trainees will be interviewed by a board constituted by the UPSC. Reports on the performance/attributes of individual trainees, prepared by the Academy, will be supplied to the board. The test will carry 400 marks. Allocation of trainees to the various services will be determined by the total of the marks obtained at the Main Examination and the Post Training Test, taking into account their preferences for the services.

Reasons for a single scheme of recruitment

3.14 We now proceed to discuss the rationale of the new scheme. The response to our questionnaire, as also the general trend of discussions which we had with different experts, showed that a significant number of them felt

that there should be a single examination for all the services;

that the candidates should be exposed to a foundation training programme after selection by examination ; and

that the final assessment of the suitability of candidates for different services should be made in terms of their attributes as revealed during the course of their training, and followed preferably by an appropriate test.

3.15 However, there was another view that since the requirements of the different services were not identical, a single selection examination may not be appropriate. This group felt that the two additional subjects, introduced for the Indian Administrative Service and Indian Foreign Service in 1951, did

permit recruitment to these services of candidates with better intellectual and other capabilities. This group also felt that the introduction of a single examination for all the services would be meaningful only if there were uniform conditions of service for all the services.

3.16 It may be recalled that the Administrative Reforms Commission advocated* the institution of a single examination for all the services. The Committee on Police Training appointed by the Government of India in 1971 under the chairmanship of Dr. M. S. Gore felt that a great deal of mediocrity had crept into the Indian Police Service and they attributed this to the lower standards prescribed in the examination and to the lower age (20 years) of entry stipulated for the Indian Police Service. They also recommended that the examination for the IPS should be identical with that for the IAS.

3.17 We fully share the views of the Administrative Reforms Commission and the Gore Committee with regard to a common examination for the civil services. Taking into account the relevant materials supplied to us by the various Ministries/ Departments what has impressed us in considering this question, is that even though the professional expertise required of a general administrator or a diplomat or a police officer or a member of any of the other Central Services vary, their general qualities of competence, traits of character and sense of commitment necessarily have a common denominator. The same applies to other qualities needed in an officer such as intellectual cohesion, articulation, sense of awareness and purpose, integrity, depth of understanding, courage of conviction and ability to respond to changing socio-economic and political situations.

In view of all these considerations, we recommend that there should be a single scheme of recruitment for the All India and Central Services listed at para 3.1.

*Administrative Reforms Commission's Report on Personnel Administration (1969).

Need for Preliminary Examination—Objective type

3.18 In Chapter 1 on General Principles we have discussed the limitations of the examination system and the need for providing a screening test when the number of candidates is very large. The number of candidates offering for the Civil Services Examination has been rising steeply over the years (*see* Table 2.2 in Chapter 2). From a total of 3647 applicants in 1950, the figure for 1975 stands at 28538. Analysis of data relating to the performance of candidates at the examination from year to year, shows that generally speaking a very large majority—70 per cent to 80 per cent—score less than 40 per cent marks in the aggregate and only 20 to 30 per cent score 40 per cent or more marks. It is obvious that the present system needs improvement and simplification so that suitable candidates may be identified for the final competition by a simpler, less elaborate and more effective mechanism.

3.19 Suggestions have been made that the number of candidates admitted to the examination could be restricted by prescribing a postgraduate degree as the minimum educational qualification or restricting the admission to graduates with first or second class degrees. Neither of these suggestions is feasible. Prescribing a postgraduate degree would not reduce the number of candidates sufficiently nor would it be otherwise suitable. The second alternative is also not appropriate because the standards of education and examination in various universities differ widely. We are of the opinion that there is need to devise a simple Preliminary Examination to serve as a screening test for the large number of candidates wishing to compete at the Civil Services Examination. This examination should at the same time be used to substantially widen the base of recruitment. We, therefore, recommend that the proposed Preliminary Examination should be held at a large number of centres dispersed throughout the country, say 100 centres to begin with. Incidentally, the IAS etc. Examination is presently also held in London. This in our view is not necessary.

It is necessary that such an examination should be easy to organise at a large number of centres and the assessment completed within a short period—a month or so. The above objectives would be best served by adopting an objective type of examination.

3.20 We discussed the merits and practicability of the objective type of examination with a number of experts of different subjects. They were nearly unanimous that for screening of candidates an objective type examination has distinct advantages, and is feasible for all subjects. The examination in all the five papers (described in para 3.10) could be conducted within two to three days and the marking of answer books completed within a very short time, the process being almost mechanical.

3.21 Introduction of the objective type of examination would need careful preparatory work by the Union Public Service Commission. There are also many other problems connected with a competitive examination which would require detailed study by competent research staff. An adequately staffed examination wing with facilities for research studies and computer work is essential for the Commission. It should be headed by an outstanding expert. We would like to emphasise that for the implementation of the proposed scheme the Commission should reorganise and strengthen its Examination Wing by induction of appropriate experts.

Indian Languages and English

3.22 We are convinced that every candidate desiring to join the All India and Central Services should have sound knowledge of at least one of the Indian languages included in the Eighth Schedule to the Constitution. A young person who lacks proficiency even in one of our languages suffers from a major lacuna and is ill fitted for public service. Indeed for the development of a well rounded personality, it is necessary that our young people should have some interest in the languages

and the related literatures of our country. We strongly recommend that there should be a compulsory paper for an Indian language, (to be selected by the candidates out of the languages listed in the Eighth Schedule) for both the Preliminary Examination and the Main Examination.

3.23 We have given careful thought to the role of English in our scheme of examinations. English has an important place in the life of our country. It is an important link language for purposes of administration, specially at the All India level. In many of our universities English continues to be the medium of education, particularly at the postgraduate level. Knowledge of English is essential for keeping in touch with new developments, particularly in science and technology. English is, perhaps, the most used medium for international communication. We recommend that there should be a compulsory paper to test the adequacy of knowledge and proficiency in the use of English.

General Studies

3.24 A university graduate aspiring to enter the All-India and Central Services should have a wide range of interests. He should be aware of what is happening around him, and possess knowledge of the country and the people. We recommend that the subject of General Studies covering these aspects, should be included in the schemes of the Preliminary as well as the Main Examinations. In the Preliminary Examination this may be covered in one paper and should include questions on General Science, current events of national and international importance, History and Geography of India, Indian Polity and Economy and the Indian National Movement. Questions on General Science should cover general appreciation and understanding of science, including matters of every day observation and experience, as may be expected of a well educated person who has not made a special study of any scientific discipline. In History, emphasis should be on broad general understanding of the subject in its social, economic and political aspects. Questions on the Geography of India should relate to physical, social and economic

Geography of the country, including the main features of Indian agriculture and natural resources. Questions on Indian Polity and Economy should test knowledge on the country's political system, panchayati raj, community development and planning in India. Questions on the Indian National Movement should relate to the nature and character of the nineteenth century resurgence, growth of nationalism and attainment of Independence.

3.25 In order to give adequate weightage to General Studies in the scheme of the Main Examination, this subject should be covered in two papers. The first paper should include (i) Modern History of India and Indian Culture, (ii) current events of national and international importance, and (iii) statistical analysis, graphs and diagrams. The second paper should cover (i) Indian Polity, (ii) Indian Economy and Geography of India, and (iii) the role and impact of science and technology in the development of India.

All parts of the papers will carry nearly equal marks.

In Paper I, Modern History of India and Indian Culture will cover the broad history of the country from about the middle of the nineteenth century and would also include questions on Gandhi, Tagore and Nehru. The part relating to statistical analysis, graphs and diagrams will include exercises to test the candidate's ability to draw commonsense conclusions from information presented in statistical, graphical or diagrammatical form and to point out deficiencies, limitations or inconsistencies therein.

In Paper II, the part relating to Indian Polity, will include questions on the political system in India. In the part pertaining to the Indian Economy and Geography of India, questions will be put on planning in India and the physical, economic and social Geography of India. In the third part relating to the role and impact of science and technology in the development of India, questions will be asked to test the candidate's awareness of the role and impact of science and technology in India, emphasis will be on applied aspects.

Essay

3.26 We feel that the overall qualities of integrated thinking and clear and precise expression, as also the depth of understanding and appreciation of a theme, can be best judged in an Essay. We are, therefore, of the view that an Essay paper should be included in the scheme of the Main Examination.

Optional Subjects

3.27 At present candidates for the All India and Central Services, except for the Indian Police Service, take three papers from a prescribed list of optional subjects. For the Police Service, two papers only are required. Candidates for the IAS and IFS take in addition two "additional" papers. The standard of the lower papers, according to the Rules of the Indian Administrative Service etc. Examination, is approximately that of an honours degree examination of an Indian university; and for the additional papers for the IAS and IFS, the standard is "higher" than the other papers.

3.28 Difference between the higher papers and others is in practice marginal. We see little reason for maintaining this distinction. In the Civil Services Examination scheme recommended in the Report, the scope of the syllabus for the optional subject papers for the Main Examination is broadly of the honours degree level. By this we mean a level higher than the bachelors degree and lower than the masters degree. This applies to all subjects except Engineering and Law where the level corresponds to the bachelors degree.

It is important to make a distinction between the scope of the syllabus and the standard of the question papers. The standard of the question papers should be appropriate to test high calibre mature candidates with serious intellectual interests, and should stretch to the full the intellectual capabilities of candidates appearing at the examination. The range covered by the questions should emphasise the core content of the subject and its application to the solution of problems. There is wide variation in the syllabi of undergraduate and postgraduate

courses in our universities and in order to reduce the effect of such variation in judging the candidates, emphasis should be on the core content of the subject rather than on mere factual information, a test of their capacity for critical analysis and not of their memory power.

In the case of university examinations, the object is primarily to distinguish between students (of average ability) who deserve to get a degree and those who do not; whereas the Civil Services Examination aims at selecting a relatively small number of high calibre candidates from a very large number of candidates of more than average ability.

To set a paper for the Civil Services Examination much greater deliberation and effort would be needed than is usual for university papers. It would be an advantage to have a board of paper setters for each paper or for a group of related papers. This has been discussed later. (This would be a more efficient arrangement than appointing paper setters and moderators who work independently of each other).

3.29 In drawing up the list of optional subjects for the Civil Services Examination we face a major problem. As discussed in Chapter I, the list, both for the Preliminary and the Main Examinations, should not be so restrictive in its coverage of subjects as would tend to deter promising candidates from offering themselves for selection. On the other hand, if the list is too large, it would hardly be feasible to maintain any reasonable uniformity of standards. Also, with a very large list of optional subjects the number of candidates in several subjects would be too small. The examination in that case would split, as it were, into a large number of separate examinations. Therefore, subjects, in which the number of competing candidates is relatively small should be avoided unless there are strong reasons to the contrary. It is apparent that there can be no clear cut criteria for determining optional subjects for the Civil Services Examination. We have tried to include for the Main Examination all of the more "common" subjects, excluding those which are

specifically professional or technical. We have also kept in view the general needs of the services.

It is in the nature of things that a list of this nature has to be a compromise between several conflicting claims and considerations. We believe that the lists recommended by us for the Preliminary and Main Examinations, prepared on the basis of detailed discussions with experts, should be found generally satisfactory. The lists should be reviewed by the Commission from time to time in consultation with the University Grants Commission and the universities.

3.30 We feel that for the Main Examination rather than examine candidates in three lower subjects at the honours level and in two subjects at the masters level as at present, offering one paper for each subject, a more comprehensive assessment of the intellectual qualities of a candidate could be carried out by prescribing, as optionals, only two subjects at honours degree level. For each subject, a fuller examination would be possible if two full length three hours papers, rather than only one paper, as at present, are prescribed. It is necessary to emphasise that the written examination is intended to assess the intellectual qualities and depth of understanding of a candidate rather than his capacity for gathering and reproducing information and data over a wide front. It is assumed in the proposed scheme that a candidate would offer as one of the optional subjects, the subject which he may have studied for the honours or masters degree. He would be required to prepare on his own only one more subject at honours degree level. This would permit the candidate to devote his preparatory effort in greater depth to only two subjects in place of at least three subjects which he has to prepare under the present scheme.

Interview Test (Main Examination)

3.31 The Personality Test* is an integral part of the process of selection for the Civil Services. The test is designed to assess

*The nomenclature of the interviews was changed from *viva voce* to Personality Test from the examinations held from 1952.

the personal suitability of a candidate particularly his social traits,—mental alertness, critical powers of assimilation, clear and logical exposition, balance of judgement, variety and depth of interest, ability for social cohesion and leadership, intellectual and moral integrity”.

3.32 Results of the written part of the examination for the three categories of services are announced separately at present. Successful candidates are required to appear before a Personality Test board of the UPSC. The board functions in two sections, one section interviewing candidates who have qualified for interview for the IAS/IFS with or without other services, and the other section interviews candidates who have qualified only for IPS and/or Central Services. Members of the two sections are interchanged periodically in order to ensure uniform standards of assessment. The section of the board, interviewing candidates for the IAS/IFS, meets only in Delhi while the other section meets at Delhi and a number of places outside Delhi, e.g. Allahabad, Bombay, Calcutta and Madras. Each board consists of five to seven members and is presided over by the Chairman or one of the members of the Union Public Service Commission. The members of the board include members of the UPSC, senior civil and foreign service officers, eminent educationists and other public men.

3.33 Each candidate spends approximately thirty minutes with the board. The Chairman opens the discussion and he is followed by other members of the board. At the end of the interview the candidate is asked to prepare a brief resume of the discussion. The marks allotted to the candidate are arrived at by consensus. The members study the resume prepared by the candidates and suggest such alterations in the marks awarded to individual candidates as they may consider necessary. It has, however, been observed that it is very infrequently that the examination of the resume by the members of the board, alters the rating which a candidate has obtained at the interview.

3.34 Our meetings with service and other experts, as also the response to our questionnaire, revealed that the majority opinion favoured the continuance of the Personality Test and even giving added weightage to this component of the recruitment process. A few, however, felt that the Personality Test did not serve any useful purpose. According to an analysis carried out by the Ministry of Home Affairs on the inservice performance of a batch of officers, recruited through the combined Civil Services Examination, the combined marks obtained by a candidate in the written examination and the Personality Test rather than the marks obtained in the written examination only, gave a better index of the candidate's expected performance in the service.

3.35 We studied the selection procedures of a few private and public sector organisations (Appendix VII). In some of the organisations a written test is employed as a first step in the process of recruitment. All the organisations, however, depend, for final assessment, on lengthy interviews over a period of time, extending in some cases to two to three days. The process of interview includes appearance of the candidate before a board and in some cases interviews with individual experts. None of the organisations, which the Committee met or contacted, employs the written test as the sole criterion for selection.

3.36 The interview assessment in some of these organisations is extended to include 'group discussions' and/or 'group tasks' and in some cases psychologists are associated with these tests. Briefly, in a group discussion, a number of candidates (eight to ten) are given a topic for discussion for a period of thirty to sixty minutes. Two or three examiners observe the performance of the participants in the discussion and assign grades for qualities such as intelligence, articulation, qualities of leadership, ability to listen, deductive logic in discussion.

In the group task system these qualities are assessed by setting a problem before a group of candidates (eight to ten) for a period of forty-five to sixty minutes. The candidates are

provided with data on the problem set to them for discussion and they are expected to arrive at a solution through collective effort.

3.37 For admission to the Defence Academies through the Union Public Service Commission, candidates have to take a series of tests. Following a written examination by the Commission, candidates, who qualify in the written examination, are required to appear before a Services Selection Board for intelligence and personality tests lasting four days. The board includes psychologists and senior service officers. These tests have a component of oral discussion as also a component of symbolic problems and written theoretical questions. The tests are aimed at measuring "officer like qualities" such as effective intelligence, reasoning and organizing ability, social adaptability, determination, courage, stamina, liveliness. Weightage to these tests is considerable ; it equals the weightage allotted to the written examination.

3.38 It is desirable that a candidate has reasonable exposure to assessors so that a correct appreciation of his overall personality traits and aptitudes, besides his intellectual qualities, may be possible. Group discussions, group tasks and/or lengthy interviews, staggered over a period of time, are useful for bringing out in a candidate the quality of his intelligence, his potential capacity to make decisions and take and give orders under different situations, and his ability to meet challenging situations.

We feel that there is need to assess in a candidate such qualities as may not be assessable unambiguously by a written test. Assessment by personal contact would substantially improve the chances of judging not only intellectual qualities, for which such contacts may provide a mechanism of confirmation, but essentially special traits of character, courage, integrity, and more particularly the specific aptitudes of the different candidates for different services.

We feel that this can be best achieved by a process of extended contact with the candidates over a period of time and

under different situations of study, field work, relaxation and other activities. We recommend that such observation should be carried out while the candidates are under training for the Foundation Course at the Academy.

3.39 In this context, the present Personality Test, which may now be called an Interview Test, should be regarded as a component of the Main Examination. We feel that this interview test would be of value for assessment of the general qualities of intelligence, mental alertness and articulation of a candidate, and help in the identification and grading of candidates for admission to the Academy. We recommend that the Interview Test should carry 300 marks. As regards the composition of the Interview Board, it would be a distinct advantage to have members representing a diversity of background and age spectrum. It would also be desirable to include women members on the board. Apart from experts and senior civil and foreign service officers, as far as possible, only serving members of the UPSC may be appointed on the board.

3.40 At this stage we would like to emphasise that it is important that the members of the boards are not required to sit on the interview boards for too long a period. Interviewing day after day is a very exhausting process and it is important that members retain their freshness of mind throughout the interviews.

At present the UPSC constitutes two boards and each board has to carry on interviews for almost as long as three months. We feel that the total period for interviews for any one board should not exceed one month. The element of variability, that may be introduced as a result of a larger number of boards, would not be any more significant than that caused by appointment of a number of examiners for the same paper. On the other hand, a larger number would introduce definitely a greater degree of reliability especially if the use of Interview Impression Cards is introduced.

3.41 It is well known that performance of candidates at interview boards is often markedly influenced by accidental, and sometimes even trivial factors. Some candidates are far more interview shy than others. An interview is a complex and in some ways an unpredictable interaction between an interview board and the candidate appearing before it. To assess with any reasonable degree of reliability the intrinsic qualities of candidates at an interview is not an easy task. It needs apart from knowledge of relevant subjects, special aptitude for interviewing, orientation in interview techniques, skill and patience.

It is, therefore, necessary that members of the Interview Board should be briefed on the techniques of interview so as to achieve a high degree of objectivity and uniformity in assessment. For this purpose, among others, the Commission could keep tape recordings of actual interviews and this could be examined subsequently for their effectiveness in assessing the candidates objectively. A few of these recordings could be reproduced for the benefit of members joining the Interview Board.

3.42 We recommend that members of the Interview Board should individually rate intellectual and personal qualities of candidates on a five point scale (much above average, above average, average, below average and much below average). The qualities which could be rated on the Interview Impression Cards would be : clarity of expression, grasp of narrative and argument, reasoning ability, appreciation of different points of view, awareness and concern for socio-economic problems, range and depth of interests, and personal attributes relevant to interaction with people. An appropriate form of an Interview Impression Card may be devised by the Commission in consultation with experts. The introduction of this procedure would help in improving the accuracy of assessment of the candidates. The final assessment by the board would be based on discussion of individual assessments made by the members.

3.43 We have given careful consideration to fixation of minimum qualifying marks for the Interview Test. Experts and those who replied to our questionnaire held divergent views on this point. A few favoured the fixation of a qualifying minimum within a range of 40 to 50 per cent while some felt that there should be no minimum qualifying marks for the Interview Test.

Standards of teaching vary considerably in the different teaching institutions and facilities in the form of books, periodicals and even contact opportunities with men of learning tend to put candidates, drawn from weaker sections of the community, particularly in rural areas, at a disadvantage. We feel that fixation of a minimum for qualifying at the Interview Test could conceivably eliminate some good candidates from this group, in spite of their rating high in their performance at the written examination. Such candidates would have reasonable opportunity to improve their form at the Academy. We, therefore, recommend that no minimum qualifying marks may be fixed for the Interview Test.

3.44 A question referred to us is whether the candidates should use Indian languages, included in the Eighth Schedule to the Constitution, in answering questions at interviews. After careful consideration we are of the opinion that, generally speaking, candidates should be encouraged to answer in English. This would facilitate the process of judgement because members of the Interview Board, drawn as they are from different regions of the country, would have knowledge of English as a common factor. This would help in securing a uniformity of standard in judging the merit of a candidate in relation to other candidates. However, in the interview, candidates are to be examined not so much on their command of the English language but on their range of qualities and attributes and the content of their thought. Should in an exceptional case a candidate express a desire to speak in an Indian language, because of his inability to explain himself adequately in English, the Interview Board should put the candidate at ease and allow him to answer in an Indian language.

3.45 In the compilation of the results for admission to the Academy, marks obtained by the candidates at the written part of the Main Examination should be added to the marks obtained at the Interview Test. The total number of vacancies in the All India and Class I Services, in a given year, should determine the number of candidates deemed to have qualified for admission to the Academy. The preacademy entry result sheet should not disclose the marks and order of merit of the qualifying candidates.

3.46 The marks obtained by a candidate at the Post Training Test should be added to the marks obtained by him at the Main Examination and the total should determine his position in the merit list. Until such time as the Academy is reorganised in terms of our recommendations, and the Post Training Test becomes a part of the selection process, the present system of allocating candidates to different services on the basis of the written examination and the Interview Test will continue. However, during this transitional stage maximum marks for the Interview Test should be 500.

Syllabus

3.47 We invited distinguished teachers from different institutions in the country for providing expert advice in respect of syllabi for different subjects included in the revised scheme of the examination. The composition of the Syllabus Committees is given at Appendix VIII. The groups were requested to prepare syllabi in their respective subjects in the context of the existing range of syllabi in the different universities. The preparation of syllabi would necessarily have to be a continuing process, to take into account new developments in the different subjects.

3.48 Experts for drawing up the syllabi for different languages and their literature were requested to conform, as far as possible, to a uniform standard. It was understood, of course, that the different levels of growth of different languages would need

variation in emphasis on different themes within a given language/literature depending on the availability of reading material in the language.

3.49 We recommend the adoption of the syllabi for the different subjects as given at Appendix IX. These should be interpreted as broadly indicating the scope of each subject for the Civil Services Examination.

Board of Examiners

3.50 We recommend that the question papers should be set by a board of examiners—consisting of three members. We feel that the board should include eminent professors and where desirable and feasible, particularly in science subjects, scholars from well known research institutions. Members of the board may be appointed for a period of two to three years with an arrangement that at least one of the members of a board is changed every year. This would help maintain a certain amount of continuity and dynamism in the deliberations of the board.

3.51 It is understood that question papers relating to optional subjects will reflect the teaching programmes and standards followed at the different institutions in the country.

3.52 It is important that the paper setters for different subjects should set question papers of a more or less equal standard. We admit that this is not an easy task but it is important to make serious endeavours in this behalf. It is not possible to invite members of different boards of examiners to meet for briefing before they take up the task of setting of the question papers as the identity of paper setters for the various papers will get known. What could be done is to give standard briefing to all members of the boards of examiners. The briefing should highlight the competitive nature of the examination and how a subject like Engineering or Mathematics has to be equated with Botany or Zoology or Languages and how important it is that the standard of various papers should be more or less equal.

It will be equally important when the scripts of candidates are assessed that outstanding scripts in various subjects secure more or less equal marks. An outstanding answer in Literature or Economics, for instance, should secure more or less the same marks as an outstanding answer in Physics or Mathematics. Further, the spread of marks in different subjects—provided the numbers in each subject are not too small—should follow more or less the same distribution pattern.

3.53 As we have mentioned earlier, the objective type examination is to be introduced for the first time in the Commission's examination system. It is important that the prospective candidates should be familiar with the type of questions which can be expected. We suggest that while notifying the examination the Commission should make available to the candidates illustrative sample question papers.

Age Limits

3.54 In terms of the existing requirements, candidates must have attained the age of 21 years on the 'crucial' date (at present 1st August of each year) for the IAS, IFS and Central Services and 20 years for the Indian Police Service. No candidate is permitted to take any of these examinations after he has attained the age of 26 years. Within these age limits, a candidate may take three chances for each category of service, namely, (i) IAS and IFS, (ii) IPS and Class II Police Services of Union Territories and (iii) Central Services, Class I and II.

3.55 The minimum age of eligibility at the Civil Services Examination was discussed at length with senior administrators and others. Consideration was also given to the relation of age to the number of years that a student is expected to spend at the school and the university for obtaining the first degree. Further, we took note of the findings of a study by the Ministry of Home Affairs relating to the average age at which students drawn from rural areas obtain the first university degree.

Whereas there was unanimity among administrators and others, who met the Committee, that the minimum qualifying age should be 21 years, there was some divergence in respect of the upper age limit. A considerable number was of the view that the upper age limit should be reduced to 24 years.

3.56 In consideration of the fact that a serious student, planning to enter the All India Services, should be adequately equipped to appear in the Civil Services Examination, we recommend that the minimum age for the Preliminary and the Main Examinations may be fixed at 21 years. We do not recommend the lower minimum age of 20 years for the Indian Police Service as is permitted at present.

3.57 We have given considerable thought to the upper age limit for the Civil Services Examination. Whereas it is necessary that the entire process of the examination should ensure identification of the really capable among the competing candidates, we feel that adequate opportunity should be provided to the late-blossomers and to those others who wish to pursue higher academic studies or obtain specialisation in a subject of their choice, before entering service careers. We feel that the interest of these candidates would be adequately protected by retaining the upper age limit of 26 years, with the usual relaxation for Scheduled Castes and Scheduled Tribes candidates and other categories as may be notified by the Government from time to time.

Number of attempts permitted at the examination

3.58 We have considered the question of the number of attempts that candidates should be allowed for the Preliminary Examination and the Main Examination. The number of vacancies being fixed in a given year, an increase in the number of attempts, affects adversely the quality of selections as it tends to help the less deserving candidates at the expense of the

more deserving⁶⁰. However, in view of the difficulties that may possibly arise on account of lack of familiarity with the Union Public Service Commission examinations, we feel that the number of attempts allowed may be two but not more*. We agree with the view of the Public Services (Qualifications for Recruitment) Committee appointed by the Government in 1955 that "the mental qualities as also the personality can best be tested in one or at the most two examinations"

3.59 It may further be observed that the existing system which permits that candidates qualifying for and joining the Police or the Central Services, may appear at the Civil Services Examination to improve their career opportunities, has come in for serious criticism from the National Academy of Administration and the respective employing departments. They complain that such probationers neglect their training at both the Academy and the Departmental Training Institutions. Some of them keep on appearing in examinations until they exhaust the admissible number of chances.

3.60 The present practice obviously is not desirable. The number of such cases would be very small with the proposed restriction on the total number of attempts permitted to a candidate. Even so, we think it wrong that the very first thing a young person should do in entering public service is to ignore his obligations to the service concerned, and instead spend his time and energy in preparation for reappearing at the UPSC examination to improve his prospect. This sets a bad example

60 An increase in the number of attempts at a selection examination for a limited number of vacancies tends to favour weaker candidates at the cost of better qualified ones. If we consider two candidates—one with ability of high selection probability and another with a low probability, the ratio of the two probabilities (of the high to the low probability) decreases with an increase in the number of attempts allowed for the examination. For example, if the two probabilities be 0.9 and 0.1 for succeeding in one attempt at the examination, then these become respectively 0.99 and 0.19 for two attempts. The ratio, therefore, is 9 for one attempt and 5 for two attempts. Thus, increasing the number of attempts from one to two, markedly favours weaker candidates.

* In UK candidates are allowed only one attempt at the Method II examination.

and should be discouraged. We recommend that commencing from the 1977 examination, candidates once appointed to the All India or Central Services (Class I) should not be permitted to reappear at a subsequent examination without resigning from service. (On introduction of Phase II of the Civil Services Examination scheme, candidates joining the Foundation Course will not be permitted to reappear at the Main Examination).

Examination Fees and Remuneration to the Examiners

3.61 We note that at present a general candidate for the IAS etc. Examination has to pay a fee of Rs. 80. For Scheduled Castes and Scheduled Tribes candidates, this fee is Rs. 20. We are of the opinion that a fee of Rs. 30 may be charged for the Preliminary Examination and Rs. 50 for the Main Examination. For Scheduled Castes and Scheduled Tribes candidates, the corresponding fees would be Rs. 7.50 and Rs. 12.50.

3.62 We have examined the structure of fees paid to the paper setters, moderators and examiners. We feel that considering the magnitude and responsibility of the task, fees paid at present are totally inadequate and need suitable revision. We suggest that a member of the board of examiners should be paid a fee of about Rs. 300 for the descriptive type question papers of the Main Examination. For setting of objective type question papers, a fee of Rs. 500 may be paid to each examiner, setting of this type of paper with a large number of questions entails more exacting efforts than a descriptive type paper.

Weightage of Papers and Interview Test

3.63 In a competitive examination the contribution of a given paper to ranking of candidates should be, ideally speaking, proportional to the ratio of the maximum marks for that paper to the total for the entire examination. However, things can be very different in practice. This is easily seen by taking a simple hypothetical example. Suppose there are three papers A, B and C

each carrying 100 marks. All candidates in paper A get identical marks, and the same applies to paper B, whereas for paper C the candidates obtain different marks. In this case the ranking of candidates depends entirely on paper C. Though notionally each paper has the same weightage (100 marks for each paper), the actual contribution to the selection process of papers A and B is zero.

3.64 It is apparent that if there is not enough 'spread of marks' for the written part of an examination in comparison to the interview part, the latter may influence selections to a greater degree than that intended or expected. It may be observed that for IAS and IFS candidates selected for appointment nearly a *fourth* owe their success to the interview marks—that is, if selection was determined by the total of written papers only these candidates would be replaced by others. This proportion is somewhat on the high side. In view of the obvious importance of the subject we suggest that it may be examined in detail by the Research Unit of the Commission.

3.65 A related question is that of clustering or bunching of marks—more than one candidate obtaining the same marks. Clustering cannot be eliminated altogether. But if it is present to any large extent, as perhaps it is for some of the Union Public Service Commission examinations, it tends to distort appreciably the competitive process. "Discretionary" considerations, such as, date of birth, marks in particular papers, and so on, have to be introduced to discriminate between candidates with identical marks. This is obviously undesirable, particularly for such prestigious and intensely competitive examinations as the All India and Central Services.

3.66 A major cause of clustering of marks is that examiners generally do not distribute adequately marks between answer books of different merit. Too much clustering is an indication of poor, even careless, examining. Further clustering is much accentuated when the maximum marks assigned to an examination is not large enough in relation to the number of candidates. For

example, if a paper carries 100 marks, and there are 10000 candidates, more than a hundred persons, on an average, will get the same marks. If say, 500 candidates have to be selected on the basis of the proposed examination, and if clustering has to be avoided, the difference between the top and the bottom selected candidates has to be at least 500 marks. This is hardly possible if the total marks for the examination is, say, only 1000 or even 2000. To reduce clustering, we have recommended that for the Civil Services Examination each paper should carry 300 marks, the total for the written examination being $300 \times 9 = 2700$. The marks for the Interview Test would be 300, making a grand total of 3000. The attention of examiners should be specially drawn towards avoiding clustering of marks as much as possible.

3.67 The number of candidates to be called for interview, in order of the total marks in written papers, should not exceed, we think, twice the number of vacancies to be filled. The matter may be further examined by the Research Unit of the Commission. If clustering of marks is altogether absent the number of candidates to be interviewed should obviously be less than the maximum marks for interview plus the number of vacancies.

CHAPTER 4

NATIONAL ACADEMY OF ADMINISTRATION

4.1 In earlier Chapters we have emphasised the importance of basic training for entrants to the All India and Central Services and the interlinking of this training with the process of selection. We believe that the full potentialities and attributes of candidates are best demonstrated and observed in the interaction of personalities with one another, in seminars and discussions, and in their participation in academic and extracurricular activities over a sufficiently long period of training at the Academy.

4.2 With a view to assessing the capabilities of the Academy to carry out the functions which we envisage, we consulted a number of people closely connected with the Academy currently and in the past. In this connection we found that the views of the trainees themselves were of great significance. We paid a visit to the Academy and had discussions with its Director, members of the staff and some of the trainees. It is our conclusion that the duration of the present Foundation Course is inadequate, as also the course content and quality of some of the staff. We appreciate the zest and enthusiasm of the present Director and his colleagues. Nevertheless, it is our considered view that the Academy, as at present organised, is ill-equipped for training civil servants capable of meeting the new challenges of development and reconstruction. We are of the opinion that the Academy requires a complete reorganisation, and that to implement our recommendations, this process should be taken in hand immediately.

4.3 The pivotal role and importance of the Academy in the training of civil servants cannot be overemphasised. New tasks and challenges of national development and reconstruction

demand the closest interaction and cooperation between the services and the community. This aspect should be particularly emphasised in the training programmes of the Academy, as also the important role of the services in promoting national coherence and unity*.

4.4 The trainees come to the Academy from different parts of the country and with different backgrounds. We attach very great importance to their working and living together in the Academy, learning from one another, and mutually contributing to intellectual, emotional and cultural development. The general atmosphere of the Academy should reinforce motivation, with the trainees looking forward to a life of dedicated service to the country and contributing effectively to its development and welfare. In all this the role and example of the faculty members and of the Director especially, is of the utmost importance. They need to be selected with the greatest care.

4.5 The number of trainees at the Academy, at the present level of recruitment to the services, would be about 500. (The number was 240 in 1950). It is likely to grow in the years to come and may perhaps reach a thousand in a decade or two. In planning the reorganisation of the Academy this aspect should be kept in view.

To promote interaction between trainees and to foster community life, it would be an advantage to distribute them

*One of the contributory causes of the high quality of the French Civil Service is the training given at the National School of Administration. The French Academy has been in existence for a long time. It was, however, completely reorganised by President De Gaulle in 1945. The Academy forms a part of the charge of the Prime Minister. One of our members had the opportunity to discuss with its distinguished Director, Dr. Racine, the problems connected with the recruitment and training of civil servants. Dr. Racine was good enough to prepare an excellent note on the Academy's organisation and functions. The note has been of great value to us not only in detailing the French experience but for the perspectives it gives on the general problems connected with the recruitment and training of the higher civil services. The note is reproduced in Appendix IV.

into groups of about 50 each, in Hostels or 'Houses'. This would also be convenient in organising programmes of fieldwork, study tours, etc.

Proposed Foundation Course

4.6 We have discussed in the earlier Chapters that the trainees joining the reorganised Foundation Course should not be assigned to the different services at that stage. At the end of the Course, the trainees would take a Post Training Test conducted by a board of the Union Public Service Commission. The board should be headed by a member of the Commission, preferably the Chairman. It should include senior members of the administrative and foreign services and three to five other experts. The board should have before it detailed individual reports, prepared by the Academy, on the performance of trainees during the period of the Foundation Course, including fieldwork. The reports should aim at an assessment of the intellectual and personal qualities, interests and attributes of the trainees.

4.7 We think that it should be possible to so schedule the Post Training Test as not to interfere with the progress of the Course. The Post Training Test Board could meet at the Academy during the last two months of the Course, interviewing about 10 trainees each day. The results, taking into account detailed individual reports on the trainees prepared by the Academy, could be finalised within one or two weeks after conclusion of the Foundation Course. We recommend that the marks for the Post Training Test should be 400. This, added to the marks of the Main Examination, would make a total of 3,400. The allocation of trainees to the various services would be determined by combining the results of the Post Training Test and the Main Examination taken before entry to the Academy.

4.8 We recommend that the duration of the Foundation Course should be at least one year. The Foundation Course

should aim at developing in trainees a sense of social responsibility and help them to acquire an understanding of the problems and tasks of development. The Course should include field experience as an essential ingredient.

4.9 The main objectives of the common training programme should be—

to provide basic orientation to trainees regarding the constitutional, administrative, socio-economic, scientific, technological and international framework within which they as officers will need to function in our society.

to provide knowledge and understanding of the process of decision making in Government.

to familiarize trainees with problems of rural areas and afford opportunities for indepth study on a selected theme based on a field enquiry.

to provide opportunities for interaction with distinguished scholars, administrators and business executives belonging to different branches of administration and management.

4.10 In this Report it would not be possible for us to outline the detailed syllabus of the Foundation Course. We suggest that for this purpose a Committee of experts may be constituted. The Committee may review the contents of the present Foundation Course; the following should find an important place in the new programme—

- (1) The National environment—the tasks of building a modern democratic state based on economic growth, social justice, secularism, national integration and composite culture.
- (2) Processes of decision making in government.

- (3) Regulatory functions of government, specially in economic and industrial fields, and the social responsibility of administrators.
- (4) Tasks of rural and urban development.
- (5) Modern management techniques and statistical methods, and their application to problems of planning and public administration.
- (6) Appreciation of scientific and technological advances and their impact on administration and social development.
- (7) International environment and its impact on our security, development and foreign economic relations.

4.11 The Academy should also provide programmes of special studies in rural development, science and technology, management, culture, and languages which the trainees may offer on an optional basis.

4.12 The methodology of training at the Academy should emphasise identification of key factors in different situations and developing alternative ways of dealing with the problems posed. There should be group discussions, important place for syndicates and written assignments. Training at the Academy should be experience based and research oriented. Special efforts would be needed to develop relevant case studies from different areas of Indian administration so that these could be effectively used in the Academy's training programme.

Considering the large number of trainees, the programme of field studies for them will need to be carefully planned. The faculty should work out programmes to enable groups of trainees to go out for field study. A trainee should spend six to eight weeks in field work in a rural area and then write a report which may be discussed at the Academy and evaluated by the faculty. This field experience should help the trainees to better appreciate the challenges of development that the country faces

and the possible avenues of tackling these problems at the cutting edge level of administration. We regard this experience as highly desirable not only for potential candidates for the IAS but also for members of the IPS, IFS and other Central Services.

Structure and location of the Academy

4.13 The Academy, which we envisage, should be a high level professional institution. It should have links with the Government at the highest level. It would be of great value to the Academy if the Prime Minister were associated with it as Chancellor. The governing body of the Academy should have the Cabinet Secretary as its President and include senior officers of the All India and Central Services and eminent public men drawn from education, industry, and public life. The membership of the governing body should be about twelve and the period of membership be of three years (one third retiring every year). The governing body may meet about four times a year.

4.14 The Academy should be headed by a Director of the rank of Secretary to the Government of India. He should be a distinguished administrator or a foreign service officer, or an should be assisted by a Council of Management. The Council should be assisted by a Council of Management. The Council of about 25 members should include some faculty members, officers from the All India and Central Services and experts from universities, Indian Institutes of Technology and Institutes of Management.

4.15 The Academy's faculty should be a proper mix of various age groups of high quality administrators, senior foreign service officers and distinguished scholars. The enriched and expanded faculty would provide an atmosphere in the Academy of a high level practical professionalism coupled with intellectual enquiry. In order to attract outstanding administrators and scholars to join the faculty the emoluments and conditions of service of the staff should be adequate. The appointment should be generally on a contract basis and renewable wherever considered necessary.

The Academy's faculty will need to be considerably strengthened in numbers and quality so that the Academy can play the important role envisaged for it. We suggest that the total strength of the faculty, should not be less than 50 to begin with, for covering adequately the wide range of subjects.

4.16 We have given considerable thought to the question of location of the proposed reorganised Academy. Mussoorie, where the present Academy is located, is far too isolated from the professional and academic life of the country. We have already mentioned that one of the main objectives of the common training programme in the Academy should be to provide opportunities for interaction with the top leadership in the academic, administrative and business fields and from public life. This is hardly possible at Mussoorie. In fact, we understand that most of the people invited for talks at the Academy do not find it possible to accept the invitation. This is a major handicap for the trainees. This problem would be further accentuated when the Foundation Course is extended and its quality raised. For these and other reasons, we feel that the present location of the Academy is not suitable and we are convinced that the Academy should be shifted from Mussoorie to a more suitable place.

Since a number of factors would need to be taken into account for deciding a suitable location for the Academy, and since we are not in a position to consider all such factors, we suggest that the Government may consider this question at an early date so that the reorganised Academy is established without delay.

4.17 We are not dealing in this Report with the post allotment professional training programmes of the IAS, IPS, IFS and other Central Services; these, we think, would need a review in the light of the reorganised Foundation Course proposed by us and the new problems faced by the higher civil services in modern India.

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Sl No.	Conclusion/Recommendation	Relevant para of the Report
1	2	3
1.	The tasks and challenges which face the country are so colossal, and demand such close cooperation and interaction between people and Government, that it is not enough to have merely competent and skilled administrators. Apart from relevant knowledge and skills, which need to be continually renovated, socio-emotional and moral qualities for working for and with the community are essential.	1.3
2.	We propose that the present method of selection be replaced by a comprehensive method taking into account our special requirements and conditions. The new method that we envisage is a combination of tests for the assessment of knowledge, and intellectual and personal attributes of candidates competing for entry into the higher civil services of our country. A test for intellectual ability alone cannot be regarded as adequate.	1.19
3.	The system of selection for the civil service now in use in the UK is fundamentally different from the pre-war system. It is called Method II [cf Appendix (III)] to distinguish it from the earlier method, now referred to as Method I. We do not regard Method II (or its equivalent) as feasible or particularly advantageous for us.	1.10
4.	We recommend that recruitment to the All India and Central Services (Class I) should be made on the basis of a unified scheme of examination common to all the services. We shall refer to it as the Civil Services Examination scheme (CSE scheme). The proposed scheme consists of three sequential stages, each making a significant and specific contribution to the total process. These are— <i>One</i> —Civil Services Preliminary Examination (Objective type) for the selection of candidates for the Main Examination;	1.20, 3.3 and 3.17

Two—Civil Services Main Examination (Written and Interview) to select candidates for entry to the Academy; and

Three—Civil Services Post Training Test to be conducted by the Union Public Service Commission, on completion of the Foundation Course at the Academy, to assess personal qualities and attributes relevant to the civil services.

5. There is need to devise a simple Preliminary Examination to serve as a screening test for the large number of candidates wishing to compete at the Civil Services Examination. This examination should at the same time be used to substantially widen the base of recruitment. We, therefore, recommend that the proposed Preliminary Examination should be held at a large number of centres dispersed throughout the country, say 100 centres, to begin with. 3.19

6. The Preliminary Examination is meant to serve as a screening test only; the marks obtained at this examination would have no other function or weightage in the selection process. 3.5 and 3.10

Question papers will be of the objective type. Question papers other than those for Indian Languages will be set in English. All papers would be of two hours duration.

7. The Preliminary Examination will consist of the following five papers: 3.10

Paper I—Indian Languages—to be selected by the candidate from the languages included in the Eighth Schedule to the Constitution.

....300 marks

Paper II—English Language Do.

Paper III—General Studies Do.

Paper IV & V—One subject covered in two papers from the list of optional subjects

....300 marks for each paper

List of Optional Subjects :

Agriculture; Botany; Chemistry; Commerce; Economics; Engineering (Civil, Electrical or Mechanical); Geography; Geology; Indian History; Law; Mathematics; Philosophy; Physics; Political Science; Psychology; Sociology; Zoology.

1	2	3
8.	The number of candidates admitted to the Main Examination should be about ten times the total number of vacancies to be filled in a year in the All India and Central Services. This should determine the standard of the Preliminary Examination. Since candidates would be permitted two attempts at the Main Examination, the number qualifying in a year, on the basis of the Preliminary Examination, should be five times the number of vacancies, averaged, say over the past three years. This number should be mentioned in the annual notification of the examination. This number would be subject to suitable addition of Scheduled Castes and Scheduled Tribes candidates, to ensure that their number is not less than five times the reserved vacancies.	3.5
9.	Civil Services—Main Examination will consist of written papers (2700 marks) and interview (300 marks). Candidates will have the option to answer the papers, except the language papers, in any of the languages included in the Eighth Schedule to the Constitution, and in English. Question papers other than the language papers will be set in English. All Papers will be of three hours duration.	3.11
10.	The written part of the Main Examination will consist of the following papers:	3.11
	Paper I—Any one of the languages of the candidate's choice from the list of languages included in the Eighth Schedule to the Constitution.	... 300 marks
	Paper II—English	Do.
	Paper III—Essay	Do.
	Papers IV & V—General Studies	... 300 marks for each paper
	Papers VI, VII, VIII & IX	Do.
	Candidates will offer two subjects out of the list of optional subjects. There will be two papers for each subject.	

List of Optional Subjects

Agriculture; Botany; Chemistry; Commerce; Economics; Engineering (Civil, Electrical or Mechanical); Geography; Geology; History; International Relations; Law; Literature of one of the following languages: Assamese, Bengali, Gujarati, Hindi, Kannada, Kashmiri, Marathi, Malayalam, Oriya, Punjabi, Sanskrit,

Sindhi, Tamil, Telugu, Urdu, Arabic, Persian, German, French, Russian and English; Management; Mathematics; Philosophy; Political Science; Physics; Psychology; Public Administration; Sociology; Zoology.

N.B.—Combinations not permissible are Political Science and Public Administration; Political Science and International Relations; Commerce and Management; and Public Administration and Management.

11. We recommend the adoption of the syllabi for the different subjects in the Civil Services Examination as given at Appendix IX. The scope of the syllabus for the optional subject papers for the Main Examination is broadly of the honours degree level *i.e.* a level higher than bachelors degree but lower than masters degree. 3.49 and 3.28
 12. The style of question papers also requires a major change. There should be greater emphasis on testing candidates powers of analytical and critical thinking, comprehension of fundamentals, and application of knowledge to meet national needs. 1.32
 13. The list of optional subjects should be neither so restricted as to discourage promising candidates from taking the examination nor too large to seriously affect uniformity of standards. Generally speaking, subjects which are of a highly specialised character or which are likely to be offered by only a very limited number of candidates should not be included in the list. The list should also take into account new developments in education. 1.13
 14. The lists of optional subjects recommended for the Preliminary and Main Examinations should be reviewed by the Commission from time to time in consultation with the University Grants Commission and the universities. 3.29
 15. Numeracy and ability to deal with quantitative aspects of problems also needs to be emphasised. 1.6
 16. We recommend that the choice of medium of examination, now available for Essay and General Knowledge papers, should also be extended to subject papers. This is desirable educationally as, well as from the point of view of equality of opportunity to eligible candidates. 1.35 and 1.40 (iv)
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17. To ensure a uniform standard of the marking of the answer books in different languages is not an easy problem. As a large proportion of answer books would be in English, at any rate for many years to come, these could serve as a kind of *norm* or comparison standard for answer books in other languages. If in any particular language the distribution of marks for answer books—the mean and standard deviation—differ greatly from those for answer books in English, statistical adjustments could be made, if considered necessary by the board of examiners. 1.36
18. It is important to avoid systematic errors. By systematic errors we mean the tendency of an examiner to uniformly mark high or low answers in one language as compared to answers in an other language. The effect of systematic errors can be reduced by providing a board of examiners, which should lay down detailed guidelines and norms for evaluation of answers. It is desirable that as far as possible, there are on the board at least two examiners to evaluate answers in any given language. It is possible to substantially improve the objectivity of the examination with such a board of examiners and by the adoption of statistical tests and checks. 1.38
19. We recommend that the question papers should be set by a board of examiners—consisting of 13 members. We feel that the board should include eminent professors and where desirable and feasible, particularly in Science subjects, scholars from well known research institutions. Members of the board may be appointed for a period of 2-3 years with an arrangement that at least one of the members of a board is changed every year. 3.5 and 3.28
20. It is important that the paper setters for different subjects should set question papers of a more or less equal standard. For this purpose, standard briefing may be given to all members of the boards of examiners. The briefing should highlight the competitive nature of the examination and how a subject like Engineering or Mathematics has to be equated with Botany or Zoology or languages and how important, it is that the standard of various papers should be more or less equal. It will be equally important, when scripts of candidates are assessed, that outstanding scripts in various subjects score more or less equal marks. Further, the spread of marks in different subjects—provided the number in each subject are not too small—should follow more or less the same distribution pattern. 3.52
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1	2	3
21.	We suggest that while notifying the examination the Commission should make available to the candidates illustrative sample question papers.	3.53
22.	The number of candidates to be invited on the basis of the results of written papers, to appear before the Interview Board of the Union Public Service Commission will be about twice the number of vacancies to be filled. If this number does not include candidates of the Scheduled Castes and Scheduled Tribes equal to twice the number of reserved vacancies, the Commission may invite an additional number of such candidates for interview by the board.	3.12
23.	The Personality Test, which may now be called an Interview Test, should be regarded as a component of the Main Examination. We recommend that the interview test should carry 300 marks.	3.39
24.	It would be a distinct advantage to have members of the Interview Board, representing a diversity of background and age spectrum. It would also be desirable to include women members on the board. Apart from experts and senior civil and foreign service officers, as far as possible, only serving members of the Union Public Service Commission may be appointed on the board.	3.39
25.	It is important that the members of the boards are not required to sit on the Interview Boards for too long a period. We feel that the total period for interviews for any one board should not exceed one month.	3.40
26.	The members of the Interview Board should be briefed on the techniques of interview so as to achieve a high degree of objectivity and uniformity in assessment.	3.41
27.	We recommend that members of the Interview Board should individually rate intellectual and personal qualities of candidates on a five point scale (much above average, above average, average, below average and much below average). The qualities which could be rated on the Interview Impression Cards would be : clarity of expression, grasp of narrative and argument, reasoning ability, appreciation of different points of view, awareness and concern for socio-economic problems, range and depth of interests; and personal attributes relevant to interaction with people. An appropriate form of the Interview Impression Card may be devised by the Commission in consultation with experts. The final assessment by the board would be based on the discussion of individual assessments made by the members.	3.43

1	2	3
28. We are of the opinion that generally speaking candidates "should be encouraged to answer questions at interviews, in English. Should in an exceptional case a candidate expresses a desire to speak in an Indian language, because of his inability to explain himself adequately in English, the Interview Board should put the candidate at ease and allow him to answer in an Indian language.		3.44
29. We recommend that no minimum qualifying marks may be fixed for the Interview Test.		3.43
30. In the compilation of the results for admission to the Academy, marks obtained by the candidates at the written part of the Main Examination should be added to the marks obtained at the Interview Test.		3.45
31. The total number of vacancies in the All India and Class I Services in a given year, should determine the number of candidates deemed to have qualified for admission to the Academy.		3.45
32. The pre-Academy entry result sheet should not disclose the marks and order of merit of the qualifying candidates.		3.45
33. At the end of the Foundation Course, the trainees would take a Post Training Test conducted by a board of the Union Public Service Commission. The board should be headed by a member of the Commission, preferably the Chairman. It should include senior members of the administrative and foreign services and three to five other experts. The board should have before it detailed individual reports, prepared by the Academy, on the performance of the trainees during the period of the Foundation Course, including field work. The board could meet at the Academy during the last two months of the Course, interviewing about 10 trainees each day. The Post Training Test should carry 400 marks.		4.6 and 4.7
34. Allocation of trainees to the various services will be determined by the total of the marks obtained at the Main Examination and the Post Training Test, taking into account their preferences for the services.		3.13 and 4.7
35. We recommend that the duration of the Foundation Course should be at least one year. The course should aim at developing in trainees a sense of social responsibility and help them to acquire and understanding of problems and tasks of development. The course should include field experience as an essential ingredient.		4.8
36. A committee of experts may be constituted to outline the detailed syllabus of the Foundation Course.		4.10

1	2	3
37. We are of the opinion that the Academy requires a complete reorganisation and that to implement our recommendations, this process should be taken in hand immediately.		4.2 and 4.5
The number of trainees at the Academy is likely to grow in the years to come and may, perhaps, reach a thousand in a decade or two. In planning the reorganisation of the Academy, this aspect should be kept in view.		
38. The Academy should be a high level professional institution. It should have links with the Government at the highest level. It would be of great value to the Academy if the Prime Minister were associated with it as Chancellor. The governing body of the Academy should have the Cabinet Secretary as its President and include senior officers of the All India and Central Services and eminent public men drawn from education, industry and public life. The membership of the governing body should be about 12 and the period of membership be of three years (one third retiring every year).		4.13
39. The Academy should be headed by a Director of the rank of Secretary to the Government of India. He should be a distinguished administrator or a foreign service officer, or an eminent scholar with administrative experience. The Director should be assisted by a Council of Management. The Council of about 25 members should include some faculty members, officers from the All India and Central Services, and experts from universities, Indian Institutes of Technology and Institutes of Management.		4.14
40. The Academy's faculty should be a proper mix of various age groups, of high quality administrators, senior foreign service officers and distinguished scholars.		4.15
41. In order to attract outstanding administrators and scholars to join the faculty, the emoluments and conditions of service of the staff should be adequate. The appointment should be generally on a contract basis and renewable wherever considered necessary. The total strength of the faculty should not be less than 50, to begin with, for covering adequately the wide range of subjects.		4.15
42. The minimum educational qualification for appearing at the Main Examination will be university degree. Candidates may, however, be permitted to take the Preliminary Examination while studying for their degree.		3.8

1	2	3
43.	A candidate should not be less than 21 years of age and not more than 26 years on 1st July (or on any other date to be prescribed by the Union Public Service Commission for the purpose) of the year in which he appears at the examination, with the usual relaxation of the upper age limit for Scheduled Castes and Scheduled Tribes candidates and other categories as may be notified by the Government from time to time.	3.6, 3.56 and 3.58
44.	We recommend that candidates (including those belonging to Scheduled Castes and Scheduled Tribes) will be permitted only two attempts for the Preliminary Examination and two for the Main Examination.	3.7 and 3.58
45.	The CSE scheme should be implemented in two phases. The first phase should consist of the Preliminary Examination and the Main Examination. We recommend that the first phase be introduced from the 1977 examination.	3.4, 3.46, 3.48 and 1.45
<p>Introduction of the third stage is expected to take more time as it involves reorganization of the National Academy of Administration. Till the introduction of the third stage, the allocation of the successful candidates to the various services will be determined by the marks obtained at the Main Examination (written examination and interview test) as at present. However, during this transitional stage the maximum marks for the interview test should be 500. We think that it should be possible to implement the full scheme by 1980.</p>		
46.	For determination of the final ranking of candidates, the relative weightage given to the Main Examination and Post Training Test should be 70 : 30. To begin with, however, the relative weightage of the Post Training Test may be fixed at about 15 per cent and which may be raised over a period of 5 years to 30 per cent.	1.27
47.	We recommend that commencing from the 1977 examination, candidates once appointed to All India or Central Services (Class I) should not be permitted to reappear at a subsequent examination without resigning from service. (On introduction of Phase II of the Civil Services Examination scheme, candidates joining the Foundation Course will not be permitted to reappear at the Main Examination).	3.60
48.	We are of the opinion that a fee of Rs. 30 may be charged for the Preliminary Examination and Rs. 50 for the Main Examination. For Scheduled Castes and Scheduled Tribes candidates, the corresponding fees would be Rs. 7.50 and Rs. 12.50.	3.61

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- | 1 | 2 | 3 |
|---|---|---|
|---|---|---|
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49. A member of the board of examiners should be paid a fee of about Rs. 300 for the descriptive type question papers of the Main Examination. For setting of objective type question papers, a fee of Rs. 500 may be paid to each examiner. 3.62

 50. We strongly recommend that candidates from weaker sections of the community, who qualify at this examination, should be provided with special counselling and guidance by the universities, and financial assistance by the State Governments to compete for the Main Examination. 1.21

 51. Introduction of the objective type examination would need careful preparatory work by the Union Public Service Commission. There are also many other problems connected with competitive examinations which would require detailed study by competent research staff. An adequately staffed examination wing with facilities for research studies and computer work is essential for the Commission. It should be headed by an outstanding expert. 3.21 and 1.41

 52. There should be a continuing review, by the Commission and the Personnel Department, of the standard of recruitment for the various services, using appropriate indices and statistical methods. If there is a noticeable lowering of standards, special steps should be taken by the Union Public Service Commission and where necessary by the Government, to remedy the situation. 1.41

 53. Steps should be taken to promote dissemination of relevant information, visits to universities and colleges by members and senior staff of the Commission, opening of more examination centres, and in other ways to widen the base of recruitment, without lowering standards, so that large sections of the community and parts of the country which are at present under represented in the higher services have a more balanced representation. 1.41

 54. A selection process or method used by the Union Public Service Commission should satisfy in our view certain basic requirements. These are— 1.40
 - (i) It should command the complete confidence and trust of candidates, of the Government and the public generally. Integrity is of the utmost importance.
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- (ii) It should provide to the maximum possible extent equality of opportunity to promising candidates irrespective of their assessment of relevant intellectual and personal qualities and attributes/motivations, irrespective of social status, region and the university degree subjects.
 - (iii) It should be such as would encourage candidates with appropriate attributes and qualities to offer themselves for selection. Deliberate effort should be made by the Commission to widen continually the base of recruitment with special attention to deserving candidates belonging to the weaker sections of the community.
 - (iv) Candidates should have option to choose any of the Eighth Scheduled languages or English for the medium of the Union Public Service Commission examinations (written).
 - (v) The various tests of knowledge, skill and personality should make full use of new developments/techniques in the methods of assessment. Each part of the selection process should make a significant contribution towards the final selection.

More than ordinary care is necessary with regard to the appointment of examiners and interviewers. They should be outstanding in their respective fields.

- (vi) It should be clearly recognised that there are certain essential qualities which defy description in words but which a "good judge of men" can usually assess with a fair degree of reliability. An interview by competent board is an indispensable element of the selection process.
- (vii) The method should be under continuous review and evaluation; continuing improvement in the light of experience and new developments is essential.

55. There are several important aspects of the work of the Commission for which it would be a distinct advantage to have a Standing Advisory Committee appointed by the Commission. The advice of the

Committee would be of great value regarding policy and action on questions of examination reform, personality test, expansion of the base of recruitment and improvement in the opportunities open to promising candidates belonging to backward communities and areas. Such a Committee could meet two or three times a year. The Chairman of the Commission should be the Chairman of the Committee and the members, about 15, should be drawn from universities, industry and public life. The term of membership should be three years, a third of the members retiring every year.

APPENDIX I

Matters referred later for the consideration of the Committee on Recruitment Policy and Selection Methods

1. The age-limits and the number of chances that should be prescribed for admission to various competitive examinations held for recruitment to the All India and Central Services.
2. Introduction of a compulsory paper in any one of the languages included in the Eighth Schedule to the Constitution for the Indian Administrative Service examination and Indian Forest Service and Indian Economic Service Indian Statistical Service Examinations.
3. The desirability of conducting the Personality Test in languages included in the Eighth Schedule to the Constitution, besides English, for Indian Administrative Service etc. Examination.
4. Use of languages included in the Eighth Schedule to the Constitution as alternative media for answering optional papers for Indian Forest Service and Indian Economic Service/Indian Statistical Service Examinations.
5. The desirability of making recruitment to the Indian Forest Service, Indian Economic Service and Indian Statistical Service through the Indian Administrative Service etc. Examination.
6. Review of the nature and contents of Union Public Service Commission competitive examinations primarily to eliminate the present premium on learning by rote keeping in view the recommendation of the Administrative Reforms Commission regarding holding of a special competitive examination of non-academic type for first class graduates.
7. Review of the present qualifications, scheme and syllabi of the Indian Economic Service/Indian Statistical Service examination and consideration of other measures necessary to ensure that adequate number of suitable candidates become available for appointment to Grade IV of these two services.
8. Review of the following recommendation made by the Conference of the Heads of Training Institutions held at LBS National Academy of Administration, Mussoorie.
 - (i) As the foundational courses are not taken seriously by the candidates, an element of incentive/disincentive should be built into the foundational course for the members of all the services.
 - (ii) The present practice of permitting the probationers of the Indian Police Service and Central Services to take the Indian Administrative Service/Indian Police Service Examination while continuing in service, should be stopped.
9. Review of the existing arrangements for publicity regarding the examinations conducted and recruitments made by the Union Public Service Commission.
10. Desirability of deleting the provision from the rule of the Commission's examinations regarding eligibility of candidates who are appearing or have appeared at the qualifying examination.

APPENDIX II

Committee on Recruitment Policy and Selection Methods

Questionnaire

Notes : 1. The Committee would be grateful for your views/comments on all or as many of the questions as you may wish to reply to. If you desire any part of the reply to be treated as confidential this may please be indicated.

2. Your name, address, designation and profession may be given with your reply.

1. In the context of tasks of national development, social objectives, and rapid growth in the scale and diversity of functions of the Government, what in your opinion should be the knowledge, skills, qualities of mind and personality, and motivation which should be expected of persons joining the

- (a) Indian Administrative Service,
- (b) Indian Foreign Service,
- (c) Indian Police Service,
- (d) Central Services Class I (Non-technical), and
- (e) Central Services Class I (Technical), such as the Indian Railway Service of Engineers and the Central Engineering Services.

2. In your opinion, do the persons selected for the various civil services/posts, possess the qualities that you consider essential for the proper discharge of their responsibilities ?

3. In relation to the present tasks and the likely new trends, what are the merits and deficiencies of the present selection methods briefly described in Annexure I ?

Do you think the present selection methods need to be changed to improve the quality of recruitment ? If a change is indicated, what form should it take ?

4. Do persons of requisite ability from different sections of society and parts of the country have a reasonably equal opportunity of selection ? If you consider that certain sections of the community or candidates coming from certain regions have to face handicaps, have you any suggestions for overcoming them ?

5. The scheme of the combined competitive examination known as "IAS etc. Examination" for recruitment to IAS, Indian Foreign Service, Indian Police Service, Central Services Class I, such as Indian Audit and Accounts Service, Indian Income-tax Service, Indian Defence Accounts Service, Indian Railway Accounts Service is given in Annexure II.

Have you any suggestions for improvement of the present scheme ?

6. Candidates for the IAS and the Indian Foreign Service are required to take two higher optional papers as evidence of higher intellectual attainments. Do you think that the higher optional papers provide a reasonably good test for this purpose ? If not, what would you suggest ?

7. (a) What is your opinion in respect of the range of subjects included in the scheme of the combined competitive examination ? Do you think that there is need for reviewing this list with a view to adding and/or deleting some subjects ?

(b) In the present scheme of "IAS etc. examination" there is no provision for subjects covering such fields as commerce, agriculture, engineering and medicine. If you think that such subjects should be provided for in the scheme of examination, specify the subjects which should be included.

8. The Government of India have decided to introduce all the languages, besides English, mentioned in the Eighth Schedule to the Constitution as alternative media of All India and Higher Central Services Examinations simultaneously.

A question paper for a competitive examination when answered in a number of optional languages poses a difficulty not easy to overcome of intercomparison of answers in different languages. Have you any suggestions to overcome these difficulties ?

If you consider that introduction of a number of languages as media of examination would adversely affect the objectivity of the examination, would you suggest an alternative scheme which you would regard as feasible ?

9. A suggestion has been made that there should be one single competitive examination for recruitment to IAS, IFS, IPS and other Central Services (Class I), and that assignment of qualified candidates to the different services be made on the basis of preferences of the candidates and their rankings in the examination. What are your views about this suggestion ?

10. The direct recruitment to the IAS/IFS is at present on the basis of the competitive examination open to persons in the age group 21—26 years. It has been suggested that besides this examination there should be direct entry to the IAS and the Indian Foreign Service of persons in the age group, say 35—45 years to enable persons with a wide range and diversity of work-experience to enter services which is not possible at present. What are your views about this suggestion ?

11. Do you think the weightage given to Personality Test in the aggregate marks allotted for IAS, IFS, IPS and CS in the scheme of combined competitive examination is adequate/inadequate/excessive ? What would be an adequate weightage in your view ?

Do you consider that the Personality Test, as prescribed is satisfactory; if not, what are your suggestions for its improvement ? (For the present system please see Annexure II).

12. It has been suggested that there is an appreciable number of talented persons in the age group 21—26 years who may not find it attractive to take a syllabus based competitive examination. For this and other reasons it may be desirable to have an alternative method of selection. This method could consist of three stages. The first stage would be a qualifying written examination to test powers of expression, and of logical analysis, and a broad awareness of the major developmental, economic and technological problems of the country. Those who qualify would spend, at the second stage, about two

days with an Expert Board for an assessment of their abilities, personality and temperaments and their scope for development. Candidates found suitable by the Expert Board go to the next stage for an interview before the Final Selection Board. (The method suggested here is on the broad lines of what is called Method II for recruitment to Administrative classes in the U K).

What are your views with regard to the desirability of an alternative method of selection ? What do you think of the method suggested ?

13. Do the Commission's examinations have any impact on the standards of the courses of studies provided by the universities ?

What method would you suggest to keep the syllabi of subjects prescribed in the schemes of the Commission's examinations up-to date and to take into account developments as regard courses of studies conducted by the universities ?

14. Do you think that students in universities/colleges generally have adequate information regarding the various examinations conducted by the Commission ? Would it be useful if the Commission published regularly an Information Bulletin for circulation to educational institutions ?

15. It has been suggested that the UPSC should maintain a Data Bank of professional manpower in the country. This would serve a variety of purposes besides assisting in recruitment. The use of Data Bank could also be available to Government Departments and public and private agencies. What is your view about this suggestion ?

16. Do you have any comments or suggestions with regard to items included in the terms of reference of the Committee which are not specifically covered by this questionnaire ?

ANNEXURE I

Selection Methods—by Examination and Selection by Interview

Recruitment through examination

Under Article 320 of the Constitution, one of the functions of the Union Public Service Commission is to conduct examinations for appointment to the Civil Services of the Union. In addition, competitive examinations are also held by the Commission, under special arrangements with the Ministry of Defence, for certain Defence Services.

2. The examinations conducted by the Commission for recruitment to various services can be broadly divided into the following:—

- (1) Through written examination only *e.g.* Geologists' Examination, Assistants' Grade Examination.
- (2) Through written examination and interview for Personality Test or *Viva Voce e.g.* IAS etc. Examination. Indian Economic Service Indian Statistical Service Examination.
- (3) Through written examination and Personality Tests (including psychological tests) *e.g.* Special Class Railway Apprentices Examination. The Psychological tests are designed to assess the candidates basic intelligence and mechanical aptitude.
- (4) Through written examination conducted by the Commission and Intelligence and Personality Tests conducted by Services Selection Board of the Ministry of Defence *e.g.* National Defence Academy Examination.

The Commission was also conducting until recently simple examinations for recruitment of Emergency Commissioned Officers and Short Service Commissioned Officers to IAS and Allied Services and certain other services.

3. The educational qualifications, the scheme and syllabi of an examination are essentially determined by requirements of the services concerned, the recruitment to which is to be made on the basis of the examination. The scheme of each examination as such varies from examination to examination, though an examination may be conducted for recruitment to more than one service, if the requirements of the Services are more or less similar, for example, the combined Engineering Services Examination, the IAS etc. Examination. Similarly there may be some specific tests required to be passed by candidates for entry to the Service *e.g.* walking test of 25 kms. in 4 hours forms part of the physical tests of candidates being recruited to the Indian Forest Service.

4. The Personality Test in the case of each examination, the scheme of which provides for such a test, is devised with due regard to all the relevant considerations including age and educational qualifications prescribed and the requirements of the service(s) concerned. The object of the interview is to assess the personal suitability of the candidate for the service/services for which

he has applied. The candidate is interviewed by a board of competent and unbiased observers who have before them a record of his career. The nature and scope of Personality Test is also spelled out in the Rules for the examination concerned. Generally speaking the technique of the interview is not that of a strict cross examination but of a natural, though directed and purposive, conversation which is intended to reveal the mental qualities of the candidate.

5. The candidates competing at the IAS etc. Examination upto 1956 were required to get a qualifying percentage of marks at the Personality Test before they could be recommended for any of the services on the results of the combined competitive examination. With effect from the examination held in 1957, candidates are not required to obtain minimum qualifying marks in interview.

6. Some of the considerations that are borne in mind by the Commission in constituting the Interview Boards are the requirements of the service, recruitment to which is to be made on the results of the examination, availability of persons for the duration of the interviews and the desirability of maintaining a certain continuity from year to year. The Commission endeavour to ensure that the Board is as broad based as may be possible and they associate with these boards persons who have distinguished themselves in diverse fields of administration, education, science and technology etc. The Commission also have a convention that no one should sit on the board, who has a relation or affinity in whom he may be interested, sitting in the examination. The Board is generally presided over by the Chairman or a Member of the Commission.

7. The following table indicates the various examinations in which P T/ Interview forms a part of the scheme of the examination along with the percentage given :

Name of Examination	Aggregate Marks	Marks allotted to Viva Voce/P T	% of Col. 3 to 2
1	2	3	4
IAS Examination:			
1955	1750	300	17.14
1956	1350	400	21.62
1957	1250	200	16.00
1958	1050	200	19.04
Combined Engineering Services Examination			
1955	1100	200	18.18
1956-58 Examination	1350	250	18.50
1959-62 Service Examination	900	200	22.20
1963 Examination	1000	400	40.00
	(Including Psychological Tests)		
Services (Electronics) Exam.	1100	200	18.18

8. The Commission have not so far adopted generally the psychical tests in the scheme of personnel selection for higher services as they felt that until the educational authorities and research institutions develop the necessary means for evolving appropriate batteries of tests suitable for Indian conditions at different levels and finally establish the validity and reliability of these tests over a period of time, it would be premature to do so.

Recruitment by method of Interview alone

9. Where direct recruitment is to be made for any post the appointing authority concerned sends the requisition to the Commission on prescribed form. The requisition is examined by the Commission with reference to the Provisions of the Recruitment Rules with particular reference to the educational qualifications, age limits etc. prescribed for that post. If no Recruitment Rules have been framed the qualifications, age limit and experience proposed are checked up with qualifications etc. prescribed for other similar posts. The post is, thereafter, advertised by the Commission.

10. The applications received in response to the Commission's advertisements are submitted to the Under Secretary concerned for his scrutiny for the purpose of making a preliminary selection of candidates. He goes through the requirements of the post, response to the advertisement etc. before making suggestions regarding the candidates to be called for interview. Thereafter, the file is submitted for the orders of the Commission through the Deputy Secretary, who also makes his recommendation. There is no hard and fast rule regarding the number of candidates to be selected for interview with reference to the number of posts advertised. This depends primarily on the nature of the post, the availability of eligible candidates and other practical considerations. Normally for each post advertised the aim is to select for interview not less than 5 and not more than 10 candidates who on paper, seem to be the most suitable keeping in view the qualifications and experience prescribed for the post. When the response is very good, the criterion regarding the qualifications and experience is pitched high so that the number of candidates to be called for interview may not be unduly large. The quality of experience possessed by the candidates, namely the level of responsibility at which the experience is obtained is also taken into consideration.

11. When the response from the candidates is not adequate—this generally happens for higher specialised posts—the Commission take the help of leading institutions engaged in relevant spheres of work to find out the names of suitable persons or if the Commission are aware of leading experts in the field they approach them directly to find out whether they would like to be considered for such posts. If they show willingness they are requested to meet the Commission for a personal talk. If they are adjudged by the Commission as suitable for such posts they are recommended for appointment.

12. In a few exceptional cases where the number of applicants for certain posts was abnormally large, the Commission screened the candidates by a written test and called only a small number of candidates who qualified at the test for interview. This method has not, however, been used extensively due to its inherent limitation.

13. Normally Interview Boards are constituted under the presidency of a Member of the Union Public Service Commission to interview the candidates. For very senior appointment, the Chairman of the Union Public Service Commission himself participates in the proceedings of the Board.

The Member or the Chairman is assisted in the interviews by a representative of the Ministry and one or two experts of high standing unconnected with the Ministry/Department concerned with the recruitment. The experts invited by the Commission as their advisers are carefully selected having regard to the requirements of each recruitment for which Interview Board is set up from all over the country and from amongst persons working under Government, public and private sectors as well as universities and other institutions of learning, art, literature etc. Among the important considerations borne in mind by the Commission in selecting their advisers are their knowledge and experience in specialised fields and the objectivity and impartiality which they display in the deliberations of the Interview Boards. The Interview Board will have before it the applications of the candidates and other documents that they may have enclosed with their applications and wherever possible the character roll in the case of candidates in Government service. The assessment of each candidate is made primarily on the basis of his performance at the interview.

14. In addition to the candidates who are recommended for the number of posts for which the requisition has been received, others who are found suitable by the Commission are kept in the Reserve List for future vacancies or vacancies in similar or analogous posts that may arise. The Commission, however, recommend to Government only as many candidates as the number for which requisition has been placed on them.

ANNEXURE II

The Rules of IAS etc. Examination (as extracted from the Rules of the 1974 Examination)

SECTION I

PLAN of the Examination

The competitive examination comprises :—

(A) Written examination in :—

- (i) Three compulsory subjects (for all services), Essay, General English and General Knowledge, each with a maximum of 150 marks (*see* sub-section(a) of Section II below) :
- (ii) A selection from the optional subjects set out in sub-section (b) of section II below. Subject to the provisions of that sub-section, candidates may take optional subjects up to a total of 600 marks for all Services except the Services under Category II (of Rules 1 and 4) for which optional subjects up to a total of 400 marks only may be taken. The standard of these papers will be approximately that of an Honours Degree Examination of an Indian University; and
- (iii) A selection from the additional subjects set out in sub-section (c) of section II below. Subject to the provisions of that sub-section, candidates may take additional subjects up to a total of 400 marks for the Indian Administrative Service and Indian Foreign Service.

The standard of these papers will be higher than that prescribed for the optional subjects under Sub-Section(A) (ii) above.

(B) Interview for Personality Test (*vide* Part D of the Schedule to this Annexure) of such candidates as may be called by the Commission, carrying maximum marks as follows :—

Category I

Indian Foreign Service	400
Indian Administrative Service	300

Category II and III

All Services.	200
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SECTION II

Examination Subjects

(a) Compulsory Subjects [*vide* sub-section A(i) of Section I above]:

	Maximum Marks
(1) Essay	150
(2) General English	150
(3) General Knowledge	150

Note:—The syllabi of the subjects mentioned above are given in Part A of the Schedule to this Annexure.

(b) Optional Subjects [*vide* sub-section A(ii) of Section I above].

Candidates for Services under Category II (cf. Rules 1 and 4) may offer any two, and for all other Services any three of the following subjects :—

	Maximum Marks
(1) Pure Mathematics	200
(2) Applied Mathematics	200
(3) Statistics	200
(4) Physics	200
(5) Chemistry	200
(6) Botany	200
(7) Zoology	200
(8) Geology	200
(9) Geography	200
(10) English Literature	200
(11) One of the following:— Assamese, Bengali, Gujarati, Hindi, Kannada, Kashmiri, Malayalam Marathi, Oriya, Punjabi, Sindhi, Tamil, Telugu and Urdu.	200
(12) One of the following :— Arabic, Chinese, French, German, Pali, Persian, Russian and Sanskrit.	200
(13) Indian History	200
(14) British History	200
(15) European History	200
(16) World History	200
(17) General Economics	200
(18) Political Science	200

(19) Philosophy	200
(20) Psychology	200
(21) Law-I	200
(22) Law-II	200
(23) Law-III	200
(24) Applied Mechanics	200
(25) Sociology	200

Provided that the following restrictions shall apply to particular optional subjects :

- (i) Of the subjects 1, 2 and 3, not more than two can be offered for any category of Services.
- (ii) Candidates for Services other than the Indian Foreign Service may not offer more than one of the languages mentioned under item 12 above. For the Indian Foreign Service only, candidates are allowed to offer any two of these languages; but no candidate shall be allowed to offer both Pali and Sanskrit.
- (iii) Of the History subjects 13, 14, 15 and 16, not more than two can be offered for any category of Services but no candidate shall be allowed to offer both World History and European History.
- (iv) Of the subjects 19 and 20, not more than one can be offered for any category of Services.
- (v) Of the Law subjects 21, 22 and 23, not more than two can be offered for any category of Services.
- (vi) Subject 24 must not be offered for the Services under Category II.

*Note :—The syllabi of the subjects mentioned above are given in Part B of the Schedule to this Annexure.

(c) Additional subjects [*vide* sub-section A(iii) of Section I above].

Candidates competing for the Indian Administrative Service Indian Foreign Service (Category I), must also select any two of the following subjects :—

	Maximum Marks
(1) (a) Higher Pure Mathematics	200
OR	
(b) Higher Applied Mathematics	200
(2) Higher Physics	200
(3) Higher Chemistry	200
(4) Higher Botany	200
(5) Higher Zoology	200
(6) Higher Geology	200

(7)	Higher Geography	200
(8)	English Literature (1798-1935)	200
(9) (a)	Indian History I (From Chandragupta Maurya to Harsha)	200
	OR	
(b)	Indian History II (The Great Mughals (1526—1707)	200
	OR	
(c)	Indian History III (from 1772 to 1950)	200
	OR	
(d)	British Constitutional History (from 1603 to 1950)	200
	OR	
(e)	European History (from 1871 to 1945)	200
(10) (a)	Advanced Economics	200
	OR	
(b)	Advanced Indian Economics	200
(11) (a)	Political Theory from Hobbes to the present day	200
	OR	
(b)	Political Organisation and Public Administration	200
	OR	
(c)	International Relations	200
(12) (a)	Advanced Metaphysics including Epistemology	200
	OR	
(b)	Advanced Psychology including Experimental Psychology	200
(13) (a)	Constitutional Law of India	200
	OR	
(b)	Jurisprudence	200
(14) (a)	Medieval Civilisation as reflected in Arabic Literature (570 AD—1650 AD)	200
	OR	
(b)	Medieval Civilisation as reflected in Persian Literature (570 AD—1650 AD)	200
	OR	
(c)	Ancient Indian Civilisation and Philosophy	200
(15)	Anthropology	200
(16)	Advanced Sociology	200

Provided that the following restrictions shall apply to particular additional subjects :—

- No candidate shall be allowed to offer both Indian History I [9(a)] and Ancient Indian Civilisation and Philosophy [14(c)].
- No candidate shall be allowed to offer both European History [9(e)] and International Relations [11(c)].

Note:— The syllabi of the subjects mentioned above are given in Part C of the Schedule to this Annexure.

SECTION III

General

1. (a) The question papers in 'Essay' and 'General Knowledge', *vide* items (1) and (3) respectively of sub-section (a) of Section II above, may be answered in English, or in any one of the language mentioned in the Eighth Schedule to the Constitution, *viz.* Assamese, Bengali, Gujarati, Hindi, Kannada, Kashmiri, Malayalam, Marathi, Oryia, Punjabi, Sanskrit, Sindhi, Tamil, Telugu and Urdu. Candidates exercising the option to answer both the papers in a language other than English must choose the same language for both the papers. The option will apply to a complete paper and not to a part thereof.

(b) Question papers in all other subjects must be answered in English, except question papers in languages, *vide* items (11) and (12) of sub-section (b) of Section II above, which, unless specifically required otherwise, may be answered in English or in the language concerned.

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2. The duration of each of the papers referred to in sub-sections (a), (b) and (c) of Section II above will be 3 hours.

3. Candidates must write the papers in their own hand. In no circumstances, will they be allowed the help of a scribe to write the answers for them.

4. The Commission have discretion to fix qualifying marks in any or all the subjects of the examination.

5. For the Indian Administrative Service and the Indian Foreign Service (Category I), the two additional papers of only such candidates will be examined and marked as attain such minimum standard as may be fixed by the Commission in their discretion at the written examination in all the other subjects.

6. If a candidate's handwriting is not easily legible, a deduction will be made on this account from the total marks otherwise accruing to him.

7. Marks will not be allotted for mere superficial knowledge.

8. Credit will be given for orderly, effective and exact expression combined with due economy of words in all subjects of the examination.

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PART D

[*Vide* sub-section (B) of Section I of Annexure II]

Personality Test.—The candidate will be interviewed by a Board who will have before them a record of his career. He will be asked questions on matters of general interest. The object of the interview is to assess the personal suitability of the candidate for the Service or Services for which he has applied by a Board of competent and unbiased observers. The test is intended to judge the mental calibre of a candidate. In broad terms, this is really an assessment of not only his intellectual qualities but also social traits and his interest in current affairs. Some of the qualities to be judged are mental alertness, critical powers of assimilation, clear and logical exposition, balance of judgement variety and depth of interest, ability for social cohesion and leadership, intellectual and moral integrity.

2. The technique of the interview is not that of a strict cross examination but of a natural, though directed and purposive conversation which is intended to reveal the mental qualities of the candidates.

3. The personality test is not intended to be a test either of the specialised or general knowledge of the candidates which have been already tested through his written papers. Candidates are expected to have taken an intelligent interest not only in their special subjects of academic study but also in the events which are happening around them both within and without their own state or country, as well as in modern currents of thought and in new discoveries which should rouse the curiosity of well educated youth.

UNION PUBLIC SERVICE COMMISSION

Dholpur House,
New Delhi,
the 6th February, 1974

NOTICE

The following Resolution was adopted by the Commission in their meeting held on 19th January, 1974:—

‘Resolved that a Committee be constituted to go into the existing system of recruitment to certain services and posts by the Union Public Service Commission and to recommend such changes as it considers appropriate.

2. The Committee will consist of the following members:—

Dr. D. S. Kothari	. . . . .	Chairman
Shri Bhagwan Sahay	. . . . .	Member
Prof. S. Chakravarty	. . . . .	Member
Shri G. Parthasarathi	. . . . .	Member
Dr. M. L. Dhar	. . . . .	Member
Prof. M. V. Mathur	. . . . .	Member

3. The terms of reference of the Committee shall be to examine and report on the system of recruitment to the All India and Central Services Class I and Class II followed by the Union Public Service Commission and to recommend such changes in the scheme of examinations and in the selection methods as would give adequate emphasis to knowledge, skills and qualities appropriate to the role and functions of the Services in the context of tasks of national development and reconstruction.

The Committee will deal, among others, with the following matters in particular:—

- (1) the desirability of having, instead of three examinations, as at present, a single competitive examination for the All India and other Class I Services recruitment to which is made through the “IAS etc. Examination”;
- (2) the adequacy of the Personality Test prescribed in the present scheme of the IAS etc. examination;

- (3) the desirability of including more subjects particularly Engineering, Commerce, Agriculture and other technical subjects, and excluding any of the existing subjects, as optional papers in the scheme of the IAS etc. Examination, and of making any other changes in the scheme of the written part of that Examination;
- (4) the number of chances that should be allowed at the IAS etc. Examination;
- (5) the measures necessary to implement the decision of Government about the use of all languages included in the Eighth Schedule to the Constitution, along with English, as media for the IAS etc. Examination;
- (6) the arrangements to be made for review at regular intervals of the syllabi of subjects prescribed for the various examinations to take into account developments as regards courses of study conducted by educational institutions;
- (7) the system of direct recruitment to the Central Services and posts, Class I and Class II, otherwise than through the competitive examinations with particular reference to the measures required to speed up recruitment;
- (8) the feasibility and the procedure to be adopted for bringing down the proportion of candidates to the number of posts to which direct recruitment is required to be made through competitive examinations held by the Commission as well as through selection by interview;
- (9) any special arrangements required in the Commission for efficient handling of recruitment to scientific and technical posts;
- (10) any other matter which in the opinion of the Committee has a bearing on the aforesaid items or which may be referred to the Committee by the Commission.

4. For its functioning, the Committee will devise its own procedures and it may set up such study groups and take the assistance of such experts as it may consider necessary in consultation with the Commission.

5. The Committee will submit its report within 4 months. The report may be submitted in parts, if that is found expedient.

A. C. BANDYOPADHYAY

Secretary,

Union Public Service Commission

APPENDIX III

Selection Method for Recruitment to the Civil Service in the United Kingdom

In the UK recruitment for the Administration Group of the Home Civil Service, the Diplomatic Service, and the Tax Inspectorate of the Board of Inland Revenue is all conducted *together* through the same selection Process (generally known as Method II)*. (Recruitment to the Police Service is made separately.) For some years after the war both Methods I and II were open to candidates. But Method I was not very popular, and from 1970 onwards, Method I has been discontinued. Before taking this step, the Civil Service Commission consulted the Committee of Vice-Chancellors and Principals. They were strongly in favour of abolition of Method I. It may be observed that research since 1930s has eroded considerably the general belief in the validity of academic examinations for judging relative intellectual abilities among close competitors. A major factor in the unpopularity of Method I is the understandable reluctance of high ability students to take another academic examination soon following their university examination and more so when they are uncertain of the special interests/bias of the examiner.

The educational qualification prescribed for Method II is a degree with honours or a comparable postgraduate degree. The age should be between 20 and 28 years. *Candidates are permitted only one attempt. Aptitude for foreign languages is an essential requirement for the Diplomatic Service.*

The Memorandum on "Appointments in Administration (1974)" states as regards nature of work of today's administrators. "The work of administrators in the Government service is demanding, responsible and varied because the activities of departments touch every aspect of the national life and because of the wide range of work that an administrator may be called upon to do within a single department. . . . Much of an administrator's work is done on paper but there is a great deal of personal contact with other government departments, local authorities, both sides of industry, and members of the public. A capacity for dealing effectively with other people at all levels is an essential quality as is also the ability to present and defend a case lucidly and persuasively. The other qualities called for are powers of critical analysis, sound judgement, a willingness to accept responsibility, and a capacity to work hard and quickly. . . . often they (administrators) work alongside economists, lawyers and scientists and other specialists as members of a team and they may well after their early years themselves specialise in a particular area of a department's interests or, for example, in personnel management or the applications of computer science."

*We have drawn upon the Report (1969) of the Committee of Enquiry on The Method II System of Selection. Chairman. . . . Davies, HMSO, London; and the Memorandum on "Appointments in Administration (1975)", issued by the UK Civil Service Commission.

The aim of Method II is to identify a limited number of outstanding persons from a large number of "credible" candidates" (about ten times as large) on the basis of a "rigorous assessment of overall intellectual and personal qualities".

The method comprises three stages :

- (i) Qualifying Tests—These are written tests held three times a year at as many as some 40 centres;
- (ii) Series of tests and interviews by the Civil Service Selection Board (CSSB), lasting two full days; and
- (iii) Interviews by the Final Selection Board (FSB). The qualifying tests consist of a passage to summarise test for constructive thinking, interpretation of simple statistics; and five objectively marked tests for language comprehension, analytical thinking, and understanding of diagrams and graphs. Prospective candidates are "strongly advised" by the Civil Service Commission to study specimen question papers supplied by the Commission.

About half of those taking the qualifying tests qualify for the next stage which is the core or heart of the whole selection process.

Candidates spend two full days with the Civil Service Selection Board, a Branch of the Civil Service Commission. Some 30 to 40 candidates are invited at a time. These are divided into groups of five each, and each group is assigned to a panel of three assessors. The panel has a psychologist, a young civil servant, and a senior (or retired) member of the Civil Service who acts as Chairman.

Candidates take a series of interview/tests, oral, written and cognitive. (There are tests in* drafting and appreciation writing). Some of these are based on material, supplied to candidates which resembles official files but relating to problems and policies which can be dealt with, without needing official experience or special knowledge. There are also group discussions; and Committee Exercises—a candidate serving both as a member and as a chairman. The CSSB interviews candidates almost throughout the year. The total number interviewed exceeds 2000. Nearly 40% are for Administration Group Services. In 1974, about 250 were interviewed for late entry as Principals (age group 28—51).

The tests developed by the Civil Service Selection Board owe their origin to methods and techniques evolved by the War Office Selection Boards during the last war. The tests reflect a high degree of professional knowledge and expertise.

The function of the CSSB is to provide the Final Selection Board with as complete a picture, as can be obtained, of a candidate's abilities, personality, and potential for development as an administrator. The CSSB does not select or rank candidates. That is done by the FSB.

The Final Selection Board consists of five members : the First or Second Commissioner (Chairman), two serving civil servants, a university professor, and one from other walks in public life. The marks awarded by the Final Selection Board determine whether a candidate is successful or otherwise.

Candidates are notified of their results within three days of interview by the Final Selection Board. About half of those appearing before the Board usually get selected. The procedure followed by the Final Selection Board as described in the Davies Report is : "Members receive the paper evidence on candidates a day or two before the interviews. At the interview the Chairman opens the questioning and is followed by, normally, not more than four other members of the Board. After the candidate has left and before general discussion of the assessment, each member of the Board gives his provisional marks. Differences are usually resolved in the subsequent discussion but failing agreement on the final marks the Chairman may take the average of all the marks or exercise his discretion. The candidate is usually present for 30 to 35 minutes; the remaining five or ten minutes allocated to the interview are spent in discussing the assessment. At the end of a session of interviews the marks awarded to individual candidates may be reviewed"

In making an overall assessment of a candidate's suitability it is kept in mind that selected persons have the potential of holding (eventually) top positions in the Civil Service. Candidates selected by the FSB join the Home Civil Service as administrative trainees. The Trainees serve in several carefully selected postings, and under individual supervision are encouraged to exercise initiative and responsibility. The best, rarely a third of the total entry, get accelerated promotions to the grade of Principal in about 5 years, whereas the others take much longer, and often do not get beyond the Principal's grade.

The Davies Report observes : ".....Method II is a selection system to which the Public Service can point with pride. No other postwar development in the field of personnel selection in this country has had so strong and so pervasive an influence and there are few, if any, equally advanced procedures for selecting potential managers or administrators which have not derived wholly or in part from Method II. It would be surprising, however, if a system which has been in existence for over twenty years were not susceptible to criticism and improvement....."And it says : "..... The greatest need is for further investigation and research to determine the effectiveness of the tests now used, to develop new tests and to ensure that its standards are neither lax nor too severe.

APPENDIX IV

*Selection Method for Recruitment to the Civil Service in France.**

There are two reasons for which the training and recruitment of the higher cadres of a country's administration are important :

- they constitute an essential element for the stability of the state,
- they contribute in preparing for the nation's future.

We consider here the formation of only general cadres of administration, *i.e.* of the principal ministries, whatever may be their function—economic, financial, social, cultural or general administration. We are not taking into account the engineering or technical cadres of the state, although these, too, must have a general administrative orientation. Future diplomats should have today a largely interdisciplinary education; they may be trained together with the internal administrators, subject to their retaining a certain specialisation.

In a modern democratic state, the regulation for the training and recruitment of administrative cadres should meet three main conditions :

- (a) to reinforce the cohesion and unity of the state by helping it to overcome divisions in administration or resist its weakness before collective pressures—whether exercised by political parties or economic or social groups.
- (b) to give the country an administration that is capable not only of governing and administering, but also of taking the initiative. Even in democratic countries, the role of the state is more and more decisive in matters of economic and social development: A purely juridical or managerial administration cannot tackle this.
- (c) the administration should be qualified to meet the needs of the country, and to discuss with its representatives and its people.

The essential problems remain :

- recruitment
- training
- the placement of these young officers trained for different branches of administration, and how to use them, at least, during the early years, for, ultimately, their life, talents and circumstances are the factors which will govern their careers.

*This note was prepared by Dr. Pierre Racine, formerly Director, National School of Administration, Paris. This is a translation of the original note which was in French.

I. Recruitment

The French and British systems are of two different types, although they have two points in common:

- (a) the unity of recruitment for all higher administrative cadres made by one single method—competitive examination under the responsibility of one single authority—the “Civil Service Commission” in Britain, and the “National Bureau of Administration” in French;
- (b) both the countries have exactly the same notion of public service and public office. If the number of candidates is large, the recruitment should be made in two steps: a pre-selection which will eliminate all those who are not evidently suitable, and a selection proper, through a competitive examination.

The recruitment systems in the two countries are very different.

1. In Great Britain

Importance is attached to two fundamental elements in the candidates: (i) general intelligence and soundness of judgement; (ii) Personality. All tests are conceived with these two aims in mind, especially the final interview taken by a selection committee. However, it is not a pre-requisite condition in Great Britain that the candidates should have knowledge in the five basic disciplines of administration—*i.e.* Law (especially public law), economics, social questions, public finance, international relations. Candidates of any specialisation may appear for and pass examinations provided they are evaluated favourably on the two points mentioned above. Although this system certainly has its advantages on account of its flexibility, it is, I feel, no longer acceptable today, if one wants to avoid having “amateurs” in the public service. It is preferable that the candidates should have a sound training in the five fields mentioned above before their final entry into the service. In fact, the idea of “Training on the job” is an illusion, especially if they are to be given basic knowledge of these five domains, which are useful to them throughout their career.

“Training on the job” gives a civil servant nothing but professional knowledge which is *immediately* necessary; and depending on the administrative department to which he is assigned, he may, for many years, continue to have considerable lacuna in fundamental subjects: a civil servant dealing with financial matters may know nothing of social or economic questions, a jurist nothing of economic ones, etc. And the risk is all the more greater, as these competitive examinations for admission to the “Civil Service” may be so organised as to attract young intelligent candidates who may have had a purely literary (classics) or a scientific training.

The British are well aware of this: for, following the criticism in the Report of the Royal Commission, presided over by Lord Fulton in 1966–68, the Government decided to set up a Civil Service College. This College, however, has not been able to provide the desired results, for two reasons:

—Candidates selected for the Civil Service on successfully completing their examinations are not immediately sent to join the College. On the contrary, they are soon attached to a Ministry where they remain for four years: and despite a few courses organised by this Ministry, they are unable to acquire the

wide knowledge necessary for the higher administrative cadres of a big country. They are purely and simply employed and assigned to tackle the needs of the moment.

—Even after keeping them for four years, the departments are reluctant to do without the services of their young officers. In fact, these civil servants spend only a few weeks at the Civil Service College, which would prefer to keep them for at least a minimum period of 14 weeks.

2. *In France*

The French system is based on a very different idea. Besides requiring qualities of general intelligence, judgement and personality, the public office is a profession to be learnt and from the very outset, presupposes sound knowledge, both general and specialised of the basic fields of administration; public law, economics, social and international problems, finance, without prejudice to the methods of administration itself.

The same system was in vogue even before the setting up of the National School of Administration when each Ministry or an administrative body recruited its officers: all entrance examinations included, besides tests on general culture, an assessment of basic knowledge, considered indispensable for service in that Ministry or administrative body.

(a) A competitive examination for admission to the French National School of Administration thus requires a sound grounding in those domains. Two-thirds of the candidates are those who have completed four years at a University and one-third of candidates come directly from the Class II public service. Hence the competitive examination consists of difficult papers in the subjects mentioned above, in addition to two papers on general culture. Of the latter two, one is similar to the British essay, and the other involves an oral examination by a jury. We feel that the latter is less satisfactory than the British interview which is held without any specified syllabus. In the French system, a candidate must read and comment on a general text before being interviewed by the jury. This method risks transforming the interview into something purely academic, while what is primarily aimed at is an appreciation of the personality of the candidate.

(b) Secondly, in the French system, the young man who by their previous training have a very broad knowledge in the domain of public service enter, to begin with, the National School where they receive training in administration for a period of 2 years and 5 months. It is only on leaving this School that they really join the administrative cadres. However, in such a system, certain precautions must be taken.

It is desirable for the state that candidates in the higher rungs of the administration should be recruited not only from all provinces and social classes—which is already a very difficult problem—but also from among families with intellectual, literary, juridical, economic and scientific backgrounds. The entrance examination to an administrative school (or, if there is no school, then to the administration itself, if one prefers to assign them directly to ministries)—should be sufficiently varied, so as to avoid attracting one type of candidates only—say, a jurist or an economist—even if his services are indispensable.

The candidates who have had a university education in law, economics, social and international problems have no difficulties in discharging their functions; on the other hand, purely literary candidates (in the French sense of those having studied the classics, philosophy and the human sciences) or purely science graduates (in mathematics, physics, chemistry, biology, etc....) whose contribution is interesting for a state should no doubt be able to join the service with their background, but their education should be completed, failing which they will be of little use in the administration.

There are two ways in which this result may be attained:

- (1) For an entrance competitive examination papers requiring a minimum knowledge of law or economics may be included along with papers based on a literary or scientific subject. The result, however, will be technically imperfect. What, on the contrary, should be included is one or two papers on general culture—or rather, on an opening to the contemporary world—so as to determine the candidates' aptitude for synthesising complex general problems and for thinking independently.
- (2) The best method seems to be to organise—after the competitive examination successfully gone through by 'literary' and 'scientific' students—a one year remedial course giving basic knowledge of public law, economics, public finance, social and international problems. The candidates will thus be made homogeneous with—but not identical to—their friends, who have already had some training in these disciplines. This remedial course is perfectly feasible. Although the Administrative School competitive examinations attract especially law graduates (with a knowledge of economics and international relations) or economics graduates (with scientific training and basic knowledge of law and social problems), the school, nevertheless, organises remedial courses, at the beginning of the academic year, for those candidates whose basic education has been heterogeneous. The only practical consequence of this measure is that they are retained in the school for about a year longer. In any case, and here I am categorical—it is impossible to leave it only to the administration (whichever this may be) to give these young officers the requisite general, administrative, social and economic training. It will employ them immediately and will think only of its immediate interests.

II. Training

The fundamental question is : should a school or a special institute be established for this purpose ?

It is understood that the training programme in such an institute will vary, depending on whether or not my conclusion stated above is applied, *i.e.* it is necessary to verify at the time of the entrance examination whether or not candidates should possess good knowledge of the important fields of administration. However, I feel that if the need for unity is important even in an old unitary and centralised state like France, it is indispensable in large, recent states of a federal nature and composed of different types of population.

Under these conditions, it may be preferably to create a special training institute (whatever be it called) which does not form a part of a university* but is directly under the purview of the Prime Minister who may delegate to it a member of the Government. There are two reasons for this:

(1) The training given to the probationers should be wider with an accent on the real needs of the administration.

(2) Such an institute will be in a position to give the probationers a common orientation; it will guarantee the cohesion of the future administration, not only on the intellectual plane, but also on the moral plane, which is in conformity with the idea of the state and of public service.

Common orientation does not mean an identical orientation; the training school should include different departments, each with one main principle discipline—general administration, economic or social administration, diplomacy, etc.

What should be the general outline of such a training programme?

Four points are essential here:

(1) Training must be absolutely interdisciplinary. Since a modern state is called upon to resolve extremely complex problems and before it comes to any decision it has to consider their multiple aspects—juridical and political, economic and financial, social and international—it is, important that during the training period, candidates are taught to analyse and synthesize all these elements in the functional sense of the word *i.e.* decisions to be made and actions to be undertaken. The idea, then is not to form pure generalists who might prove to be superficial in today's world, but, rather, general administrators, who have had a predominant training in any one line; some with a greater aptitude for law, others for economics, some with scientific background at the outset but who are made homogeneous by the one year remedial course at the institute, wherever necessary.

In this respect, the example and the very evolution of the French National School of Administration are conclusive. Founded by de Gaulle in 1945, the School wisely based its training well balanced between a general orientation common to all, and an intensive orientation divided into four sections: general administrators, (fundamentally jurists), economic and financial administrators, social administrators and diplomats. None of these categories, however, was ignorant of the essential elements of the training in the other three. In any one main field, the training was both pluri-disciplinary and intensive.

*Note: The collaboration of a University and its faculty is necessary for training young administrators, to train them in general culture, as well as to impart to them fundamental knowledge of law, economics, social and international relations, and also to give them an idea of the functioning of the training institute itself. But the faculty rarely has direct experience of public life and administration, and a school which prepares its students for administrative functions, should, therefore, be independent of a university. It should essentially be functional and practical.

In 1958, on account of some momentary reasons, a mistake was committed. The National School began recruiting and training all its candidates in an identical fashion. This was undoubtedly an error in a school which should normally be an institute of applied administration. The poly-valency of disciplines necessarily leads to a rapid, if not to a superficial study of all the problems. Minds gain in strength only when they are able to deepen their study of the principal subject that corresponds to their earlier training. And it is enough that they are trained to consider all other aspects.

In 1971, the School returned to a wiser system, balanced between a common orientation for all and a specialised orientation corresponding to the main discipline of the students; general administrators with public law as their major, economic administrators with economics as their major, but each with a sufficient knowledge in the other's field.

(2) At such an institute/school, there is the necessity of integrating into the training, both practical lessons and lessons learned from experience. A school which aspires to train university degree holders, should especially try to make them study and resolve real problems, and also make them aware of the exigencies and responsibilities of the administration. There should be nothing theoretical or abstract in their training.

It is, therefore, essential that an important part of the academic training be devoted to practical work, first under the authority of responsible administrators, then in industrial, commercial or banking enterprises. During this period, probationers should participate in all the activities of their chief who is, in a sense, both their teacher as well as their hierarchical superiors. They should work hard on their own, but in a selective way, so as to draw the maximum benefit from a wide range of experience and work, both on the administrative and on the human and social level.

The role of a National School of Administration, or of an institute for the training of administrators, is to teach its students to think in terms of action and decision. This cannot be done unless they themselves are involved in the responsibilities of an active administrator, who is posted outside the capital, close to reality and to the population. The method of studying "cases" in class-rooms is certainly useful, but can never replace direct experience acquired in the field and in the company of a responsible official.

In the French National School of Administration, half of the academic time is devoted to this type of practical training for which a special director—the Director of Training—is responsible. The success of this training depends not only on a clear definition of objectives, but also on the choice of administrators capable of educating probationers, and on the quality of relations between the school management and the administrators.

(3) A school or an institute of administrative training should give its probationers a thorough grounding in management. All officers have important administrative duties, and should be initiated, during their training period, to the corresponding techniques and methods. These methods are of two kinds :

- (a) classical, administrative, budgetary and book-keeping techniques and methods which teach them preparation of texts and notes for their superiors, management of budgets, management of personnel and

signing of public contracts. This type of training will teach young officers not only the practice of these methods but also the administrative and financial rigour and exactitude without which there cannot be administration.

- (b) techniques of modern management to which they should be initiated—accounting in private and public enterprises, collecting information, statistics, having a minimum knowledge of mathematics necessary to follow certain decisions (bringing investments up to date etc.). Teaching programmes will vary according to the background of the candidates and their preliminary training. The aim in all these fields is not to turn out specialists, but to make probationers aware of essential techniques and methods, so that they may appreciate both their utility and their limits.

(4) Finally—and the moral point of view is not the least important—the training school or institute of this type should try and inculcate—with all the means at its command—a civic sense and at the same time the idea of service to the country and to its people.

In this regard, a very important factor in the probationers' education is the example set by the chiefs of their training programme. This is one additional reason why the latter should be chosen not merely because of their skill or efficiency, but also because of their moral qualities and personal disinterestedness.

III. The assignment of young officers to different branches of administration

When the state decides to establish a centralised system of recruitment and training general cadres of its administration, this is one of the most delicate problems it faces. In fact, there were very few problems in France before the creation of the National School of Administration as each Ministry or Administrative body itself organized its own recruitment—i.e. held its own entrance examinations. The candidates used to select the competitive examination or examinations they liked; if successful, they had no reason to complain about belonging to this or that branch of administration, nor did they have any reason to compare their future with that of other assigned to departments other than their own.

On the contrary, with a centralised system, all administrative wings, are more or less in competition with one another on the same footing. The social and administrative prestige, the job satisfaction that they hold out the chances that they offer for climbing rapidly to positions of responsibility are known in advance and the young men recruited after the competitive examination in such an institute do not fail to make comparisons.

Thus, a centralised system of recruitment and training is valid only if the state authorities at the highest level are concerned not only about the creation of a section of public office or a "Civil Service Department", but also about conceiving and executing a global policy which aims at making the best use of young officials recruited and trained in this manner. This policy should naturally respect the freedom and responsibility of each administration in the management of civil servants attached to it; at the same time, it should be capable of establishing certain general directives, which would harmonise, as far as possible, the chances and careers of these very officers. This is a difficult task, but one which needs thinking over.

This much said, many systems are possible for the assignment of officers to various departments.

(1) The officers may choose their area of administration in the assigned Ministry right from the time of their entrance to the Training School or Institute. If they do not get the Ministry of their choice, they may try again the following year, after having resigned from the previous Ministry. This system has the advantage of being flexible and of avoiding any feeling of frustration; but the drawback of the system is that once candidates are admitted to the school and feel sure of the avenues open to them, they do not work enough at the institute, even if the courses are lively and interesting. And although the younger generation is aware of the active and lively nature of this training, it should be seen to it that their sojourn at the institute does not tend to be merely a pleasant stay at state expense.

(2) The second system is the kind followed at the National School of Administration. It has its advantages as well as its drawbacks. The entrance examination assures admission only to the school. The selection of a career is made at the end of the academic term by virtue of the choice made as per the order of final results. This system stimulates students to do their best so as to have the maximum of chances. On the other hand, it runs the risk of creating a climate of competition detrimental to their training, of creating illusions which may be unfavourable to certain students at the time of the final choice. However, these drawbacks are not decisive in any way, and can be attenuated. The more active and lively the training, the more interested are the students, even if they know that their future depends on their results.

But it must be remembered that this system can be accepted only if differences of prestige and interest among the various branches of administration to which young officers are assigned on passing out from the school, are not too great.

In France, unfortunately, this difference exists. The three services of the state—the State Council (Conseil d'Etat); the Audit Office (La cour des Comptes) and the Office of the Inspector General of Finance (Inspecteur General des Finances) are considered, not by the students alone, but by everyone, as superior organs of the state. Their members enjoy great independence, and are often called upon to collaborate with ministers, who employ them in large numbers in their Ministries. Since these officers are closer to power than most others, they are in a better position to attain posts of responsibility in the state outside their own services. It is bad if this practice degenerates into a system. For it risks confirming that some services are more privileged than the rest; further, it is also an obstacle to the internal fluidity and mobility of administration. Officers quitting a particular post have a tendency to get it filled by their younger friends who are only too eager to be absorbed as quickly as possible. But the existence of these three services is a legacy of French history and sociology. When no particular wing of administration is considered superior to another, the inconvenience arising from a rigid system of assignment based on final classification, diminishes or even disappears. These drawbacks can be avoided by a policy of public service, by organising every few years a certain mobility in the different branches of administration.

There has been no 'important service' in Britain in the French sense of the word till recent times. Nevertheless, an attachment to the Treasury was regarded by the new civil servants as most promising. In spite of that, it is not comparable to the prestige of the three services in France.

1	2	3
1951	Two additional subjects were required to be taken by candidates competing for IAS/IFS from the following subjects— (1) Higher Pure Mathematics or Higher Applied Maths, (2) Higher Chemistry, (3) Higher Physics, (4) Higher Botany, (5) Higher Zoology, (6) Higher Geology, (7) English Literature from 1780 to 1901, (8) Indian History from 1600 to the present day or British Constitutional History from 1603 to the present day or European History from 1789 to 1878, (9) Advanced Economic Theory or Advanced Indian Economics, (10) Political Theory from Hobbes to the present day or Political Organization and Public Administration, (11) Advanced Metaphysics including Epistemology or Advanced Psychology including Experimental Psychology, (12) Arabic Civilization including Muslim philosophy or Persian Civilization and Philosophy or Sanskrit Civilization including Hindu Philosophy, (13) Social Anthropology.	52
1952	Additional Paper on Social Anthropology was divided into two namely, Anthropology and Sociology. An additional subject on Higher Geography was added.	54
1953	The additional subject—'Sanskrit Civilization including Hindu Philosophy' was re-named as 'Ancient Indian Civilization and Philosophy'.	
1954	Additional subjects as at item 12 in 1951 were changed to :—'Medieval Civilization as reflected in Arabic Literature (570 AD to 1650 AD) or Medieval Civilization as reflected in Persian Literature (570 AD to 1650 AD) or Ancient Indian Civilization and Philosophy.'	
1955	No change.	
1956	Pali was added as one of the optional subjects.	55
1957	No change.	
1958	No change.	
1959	No change.	
1960	No change.	
1961	Hindi was introduced as an optional subject.	56
1962	No change.	

1	2	3
1963	No change.	
1964	No change.	
1965	No change.	
1966	The list of revised subjects is as under:—	61

Optional Subjects:—

- (1) Pure Mathematics. (2) Applied Mathematics, (3) Statistics. (4) Physics. (5) Chemistry. (6) Botany. (7) Zoology. (8) Geology. (9) Geography. (10) English Literature. (11) Hindi. (12) One of the following :—

Arabic. Chinese. French. German. Latin. Pali. Persian. Russian. Sanskrit and Spanish. (13) Indian History. (14) British History. (15) European History. (16) World History. (17) General Economics. (18) Political Science. (19) Philosophy. (20) Law. (21) Public International Law. (22) Mercantile Law. (23) Advanced Accountancy and Auditing. (24) Applied Mechanics. (25) Prime Movers.

Additional Subjects:—

- (1) Higher Pure Mathematics. or Higher Applied Mathematics. (2) Higher Physics. (3) Higher Chemistry. (4) Higher Botany. (5) Higher Zoology. (6) Higher Geology. (7) Higher Geography. (8) English Literature. (1798—1935) (9) (a) Indian History-I (From Chandragupta Maurya to Harsha), or (b) Indian History-II (The Great Mughals—1526—1707) or (c) Indian History-III (From 1772—1950) or (d) British Constitutional History (From 1603—1950) or (e) European History (1789—1878). (10) (a) Advanced Economics or (b) Advanced Indian Economics. (11) (a) Political Theory from Hobbes to the present day or (b) Political Organisation and Public Administration. (12) (a) Advanced Metaphysics including Epistemology or (b) Advanced Psychology including Experimental Psychology. (13) (a) Constitutional Law of India or (b) Jurisprudence. (14) (a) Medieval Civilization as reflected in Arabic Literature (570 AD—1650 AD) or (b) Medieval Civilization as reflected in Persian Literature (570 AD—1650 AD) or (c) Ancient Indian Civilization and Philosophy. (15) Anthropology. (16) Sociology.

1	2	3
1967	1. Psychology added as one of the optional subjects. 2. Prime Movers removed from the list of optional subjects. 3. International Relations added as one of the additional subjects.	62
1968	1. Advanced Accountancy and Auditing removed from the list of optional subjects. 2. Sociology included as one of the optional subjects.	
1969	The languages mentioned in the Eighth Schedule to the Constitution, other than Hindi and Sanskrit (which were already included) added as optional subjects. These are—Assamese, Bengali, Gujarati, Hindi, Kannada, Kashmiri, Malayalam, Marathi, Oriya, Punjabi, Sindhi, Tamil, Telugu and Urdu.	75
1970	The subjects (1) Law, (2) Public International Law, (3) Mercantile Law were renamed as (1) Law-I, (2) Law-II and (3) Law-III. Spanish and Latin were dropped from the list of optional subjects.	73
1971	No change.	
1972	No change.	
1973	No change.	
1974	No change.	
1975	The list of subjects is as follows :—	73

Optional Subjects :—

- (1) Pure Mathematics, (2) Applied Mathematics, (3) Statistics, (4) Physics, (5) Chemistry, (6) Botany, (7) Zoology, (8) Geology, (9) Geography, (10) English Literature, (11) One of the following :—
(i) Assamese, (ii) Bengali, (iii) Gujarati, (iv) Hindi, (v) Kannada, (vi) Kashmiri, (vii) Malayalam, (viii) Marathi, (ix) Oriya, (x) Punjabi, (xi) (a) Sindhi-Devnagari (b) Sindhi-Arabic, (xii) Tamil, (xiii) Telugu and (xiv) Urdu, (12) One of the following :—
(i) Arabic, (ii) Chinese, (iii) French, (iv) German, (v) Pali, (vi) Persian, (vii) Russian, (viii) Sanskrit, (13) Indian History, (14) British History, (15) European History, (16) World History, (17) General Economics, (18) Political Science, (19) Philosophy, (20) Psychology, (21) Law-I, (22) Law-II, (23) Law-III, (24) Applied Mechanics, (25) Sociology.

Higher Optional Subjects

- (1) (a) Higher Pure Mathematics or (b) Higher Applied Mathematics (2) Higher Physics. (3) Higher Chemistry, (4) Higher Botany, (5) Higher Zoology, (6) Higher Geology, (7) Higher Geography, (8) English Literature (1798—1935), (9) (a) Indian History I (From Chandragupta Maurya to Harsha) or (b) Indian History II (The Great Mughals) (1526—1707) or (c) Indian History III (From 1772 to 1950) or (d) British Constitutional History (From 1603 to 1950) or (e) European History (From 1871 to 1945), (10) (a) Advanced Economics or (b) Advanced Indian Economics, (11) (a) Political Theory from Hobbes to the present day or (b) Political Organisation and Public Administration or (c) International Relations, (12) (a) Advanced Metaphysics including Epistemology or (b) Advanced Psychology including Experimental Psychology, (13) (a) Constitutional Law of India or (b) Jurisprudence, (14) (a) Medieval Civilization as reflected in Arabic Literature (570 A.D.—1650 A.D.) or (b) Medieval Civilization as reflected in Persian Literature (570 A.D.—1650 A.D.) or (c) Ancient Indian Civilization and Philosophy, (15) Anthropology, (16) Advanced Sociology.
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N.B.:—The combination of optional and additional subjects were subject to certain restrictions.

APPENDIX VI

Arithmetic Mean and Standard Deviation of Marks in various subjects obtained by General Candidates recommended for appointment for (Category I) on the basis of Indian Administrative Service etc. Examinations, 1972, 1973 and 1974.

Sl. No.	Subject	Number of candidates recommended				Mean Marks				Standard Deviation			
		1972	1973	1974		1972	1973	1974		1972	1973	1974	
1	2	3	4	5		6	7	8		9	10	11	
<i>Compulsory</i>													
(Maximum marks for each paper 150)													
1.	Essay	104	133	116		91.03	90.49	86.08		18.35	21.83	18.4	
2.	General English	104	133	116		83.91	78.87	86.21		10.75	20.99	16.97	
3.	General Knowledge	104	133	116		76.80	75.21	71.21		13.45	13.66	10.18	
<i>Optional Papers</i>													
(Maximum marks for each paper 200)													
4.	Pure Mathematics	20	24	17		138.70	151.42	131.80		22.88	24.00	34.33	
5.	Applied Mathematics	21	20	12		141.62	137.55	132.90		22.97	29.81	23.97	
6.	Statistics	5	4	7		135.20	126.25	134.43		24.07	30.98	24.17	
7.	Physics	26	35	30		118.27	109.97	115.27		19.90	22.11	16.17	
8.	Chemistry	13	10	18		133.38	121.70	136.78		13.54	20.00	15.11	
9.	Botany	3	3	3		123.00	116.00	145.00		22.22	13.08	8.67	
10.	Zoology	3	4	4		128.00	135.75	117.25		7.87	17.97	15.1	

11. Geology	1	1	84.00	124.00	128.00	6.34	—	—
12. Geography	3	6	126.33	126.00	115.00	21.96	11.30	29.70
13. English Literature	19	23	124.42	126.04	128.10	20.79	14.41	22.42
14. Hindi	1	—	110.00	—	—	—	—	—
15. Arabic	—	—	—	—	—	—	—	—
16. Chinese	1	3	138.00	125.00	167.00	—	18.52	—
17. French	4	3	85.75	83.67	151.00	20.79	39.72	—
18. German	—	2	—	137.00	104.00	—	5.66	—
19. Pali	—	—	—	—	—	—	—	—
20. Persian	—	—	—	—	—	—	—	—
21. Russian	—	—	—	—	—	—	—	—
22. Sanskrit	3	1	125.67	112.00	—	9.84	—	—
23. Indian History	24	40	114.50	113.30	111.21	9.87	14.95	17.29
24. British History	38	61	125.44	102.31	120.45	14.57	19.57	18.25
25. European History	48	54	110.42	108.44	114.15	18.54	15.75	15.06
26. World History	4	2	118.25	107.00	118.20	19.71	2.83	21.36
27. General Economics	8	14	119.50	127.07	113.86	17.80	19.28	17.48
28. Political Science	24	35	106.21	100.14	110.50	19.93	17.55	18.83
29. Philosophy	—	4	—	110.50	125.00	—	28.63	21.21
30. Law I	6	6	109.33	103.17	130.00	28.62	19.34	14.14
31. Law II	9	8	99.88	95.50	95.80	22.65	7.54	19.20
32. Law III	15	21	123.20	114.90	124.79	21.99	17.20	16.61
33. Applied Mechanics	2	2	117.50	112.00	132.00	10.50	5.66	29.05
34. Psychology	3	4	121.33	110.75	134.00	10.08	2.99	11.31
35. Sociology	5	7	112.80	128.57	135.80	20.55	20.09	13.12

1	2	3	4	5	6	7	8	9	10	11
36. Assamese		—	—	—	—	—	—	—	—	—
37. Bengali		—	—	—	—	—	—	—	—	—
38. Gujarati		—	—	—	—	—	—	—	—	—
39. Kannada		—	—	—	—	—	—	—	—	—
40. Kashmiri		—	—	—	—	—	—	—	—	—
41. Malayalam		1	1	—	—	111.00	—	—	—	—
42. Marathi		—	—	—	—	—	—	—	—	—
43. Oriya		—	—	1	—	—	121.00	—	—	—
44. Punjabi		—	—	—	—	—	—	—	—	—
45. Sindhi (In Devnagari Script)		—	—	—	—	—	—	—	—	—
46. Tamil		—	—	4	—	—	110.75	—	—	19.74
47. Telugu		—	—	—	—	—	—	—	—	—
48. Urdu		2	—	—	125.50	—	—	1.50	—	—

Higher Optional Papers

(Maximum marks for each paper 200)

49. Higher Pure Mathematics	6	5	6	123.00	115.00	153.30	17.40	59.11	23.24
50. Higher Applied Mathematics	10	8	3	115.80	95.63	122.00	25.50	38.44	10.82
51. Higher Physics	22	34	20	115.50	124.00	95.80	16.03	15.20	16.29
52. Higher Chemistry	4	3	12	130.25	138.30	141.10	17.98	15.14	22.85
53. Higher Botany	2	2	3	122.50	116.00	125.00	3.54	8.49	13.45
54. Higher Zoology	3	3	2	123.00	122.00	139.50	3.56	20.30	2.12

55. Higher Geology	1	1	—	89.00	92.00	—	—	—	—
56. Higher Geography	3	3	—	114.00	127.33	—	5.29	10.69	—
57. English Literature from 1798 to 1935	15	21	20	119.00	116.14	122.05	12.42	12.28	17.94
58. Indian History I from Chandragupta Maurya to Harsha	3	9	13	103.33	117.56	119.69	15.62	10.53	16.58
59. Indian History II The Great Mughals from 1526 to 1707	23	31	26	103.70	109.23	123.85	10.24	24.52	20.12
60. Indian History III from 1772 to 1950	7	2	2	102.45	113.00	102.00	11.13	1.41	28.28
61. British Constitutional History from 1603 to 1950	17	31	28	120.29	114.65	114.25	13.60	14.64	7.86
62. European History from 1871 to 1945	29	26	25	114.59	112.19	114.20	3.22	13.61	14.08
63. Advanced Economics	2	3	5	109.00	121.33	119.00	11.31	6.11	15.17
64. Advanced Indian Economics	6	10	7	113.67	103.30	100.57	14.18	16.91	14.65
65. Political Theory from Hobbes to the present day	13	23	24	105.46	106.78	105.58	19.42	22.23	20.51
66. Political Organisation & Public Administration	8	6	5	117.38	120.50	139.60	10.04	25.05	12.58
67. Advanced Metaphysics including Epistemology	—	5	1	—	111.60	87.00	—	7.64	—
68. Advanced Psychology including Experimental Psychology	3	—	—	116.33	—	—	10.66	—	—

70. The period of the	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																																																																																																																																																																																																																																																																																																																																																																																																																								
71. The period of the	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																																																																																																																																																																																																																																																																																																																																																																																																																								
72. Medieval Civilization as reflected in Persian Literature (570 A.D. to 1650 A.D.)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																																																																																																																																																																																																																																																																																																																																																																																																																								
73. Ancient Indian Civilization and Philosophy	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																																																																																																																																																																																																																																																																																																																																																																																																																								
74. Anthropology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																																																																																																																																																																																																																																																																																																																																																																																																																								
75. Advanced Sociology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																																																																																																																																																																																																																																																																																																																																																																																																																								
76. International Relations	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																																																																																																																																																																																																																																																																																																																																																																																																																								
77. Sindhi (In Arabic Script)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																																																																																																																																																																																																																																																																																																																																																																																																																								
Written Total (Maximum marks 1450)	101	133	116	116	839.14	815.15	840.17	54.81	48.00	47.14																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		

APPENDIX VII

Names of organisations whose selection procedures were studied

1. Delhi Cloth Mills Ltd., Delhi.
2. Hindustan Levers Ltd., Bombay.
3. State Bank of India, Bombay.
4. Atomic Energy Department, Bombay.
5. Larson and Toubro Ltd., Bombay.
6. Tata Institute of Fundamental Research, Bombay.
7. Tata Administrative Service Committee, Bombay.
8. Indian Tobacco Company, Calcutta.
9. National Institute of Bank Management, Bombay.

APPENDIX VIII

Names of experts who were associated with the preparation of the syllabus of various subjects proposed for inclusion in the Preliminary and the Main examinations

COMPULSORY SUBJECTS

1. English & Indian Languages

1. Prof. G. C. Bannerjee,
Retd. Professor of English,
Bombay.
2. Dr. S. K. Kumar,
Head of the Department of English,
Osmania University.
3. Prof. P. B. Pandit,
Head of the Department of Linguistics,
Delhi University.

2. General Studies

1. Prof. Niharranjan Ray,
Professor Emeritus,
Calcutta University.
2. Dr. Jagjit Singh,
New Delhi.
3. Dr. Shib K. Mitra,
Joint Director,
National Council of Educational Research & Training,
New Delhi.
4. Prof. S. Mookerjee,
Dean,
School of Life Sciences,
Jawaharlal Nehru University.
5. Prof. Moonis Raza,
Director & Chairman,
Centre for the Study of Regional Development,
School of Social Sciences,
Jawaharlal Nehru University.
6. Dr. B. K. Nayar,
Formerly Executive Secretary,
Indian National Science Academy,
New Delhi.

OPTIONAL SUBJECTS

1. Agriculture

1. Dr. A. S. Atwal,
Dean,
Punjab Agricultural University,
Ludhiana.
2. Dr. S. K. Mukherjee,
Member,
National Commission on Agriculture,
New Delhi.
3. Dr. M. K. Moolani,
Assistant Director General,
Indian Council of Agricultural Research,
New Delhi.

2. Botany

1. Prof. H. Y. Mohan Ram,
Head, Deptt. of Botany,
Delhi University.
2. Dr. V. Puri,
Prof. Emeritus,
Department of Botany,
Meerut University.
3. Dr. A. K. Sharma,
Ghosh Professor and Jawaharlal Nehru Fellow,
Department of Botany,
Calcutta University.

3. Chemistry

1. Dr. R. C. Mehrotra,
Vice-Chancellor,
Delhi University.
2. Prof. V. V. S. Murty,
Prof. & Head,
Department of Chemistry,
Delhi University.
3. Prof. P. T. Narasimhan,
Department of Chemistry,
Indian Institute of Technology,
Kanpur.
4. Prof. H. C. Gaur,
Department of Chemistry,
Delhi University.

4. Commerce

1. Prof. A. B. Ghosh,
Retd. Professor & Head,
Department of Commerce,
University of Delhi.
2. Prof. T. S. Grewal,
Joint Dean,
Institute of Chartered Accountants of India,
New Delhi.
3. Dr. M. O. Mathew,
Professor & Head of the Department of Commerce,
Annamalai University.
4. Prof. V. S. Murty,
Prof. of Business Management,
J. Bajaj Institute of Management Studies,
Bombay University.

5. Economics

1. Dr. P. B. Desai,
Director,
Institute of Economic Growth,
Delhi.
2. Prof. Mohammad Shabbir Khan,
Dean, Faculty of Social Sciences,
Aligarh Muslim University.
3. Dr. A. L. Nagar,
Head of the Department of Economics,
Delhi School of Economics,
Delhi University.
4. Prof. Tapas Majumdar,
Professor of Economics,
Centre of Educational Records,
Jawaharlal Nehru University.

6. (i) Civil Engineering

1. Dr. P. N. Chatterjee,
Director of Technical Education,
West Bengal Government.
2. Dr. R. K. Narasimhan,
Professor of Civil Engineering,
Indian Institute of Technology,
Kharagpur.
3. Prof. Saranjit Singh,
Professor of Civil Engineering,
Indian Institute of Technology,
Delhi.

5. (ii) Electrical Engineering

1. Dr. S. M. Sen,
Dean and Head,
Electrical Engineering Department
M.S. University of Baroda.
2. Prof. S. V. C. Aiya,
Bangalore.
3. Dr. G. De, Professor,
Department of Electrical Engineering,
Indian Institute of Technology,
Bombay.
4. Dr. D. V. S. Murty,
Professor in Electrical Engineering,
Indian Institute of Technology,
Kharagpur.
5. Prof. G. S. Sanyal, Head,
Centre for Research & Training in Radar and Communication,
Indian Institute of Technology,
Kharagpur.

5. (iii) Mechanical Engineering

1. Dr. Jagdish Lal,
Director,
Indian Institute of Technology,
Kanpur.
2. Dr. Sukumar Dutta,
Professor of Mechanical Engineering,
Jadavpur University.
3. Prof. B. R. Narayana Iyengar,
Retd. Principal and Professor of Mechanical Engineering,
Bangalore.
4. Dr. M. L. Mathur,
Head,
Department of Mechanical Engineering,
Jodhpur University.

7. Geography

1. Dr. M. R. Chaudhuri,
Professor & Head,
Department of Geography,
Burdwan University.
2. Prof. Mohammad Shafi,
Head, Department of Geography,
Aligarh Muslim University.
3. Dr. R. Ramachandran,
Delhi University.

8. Geology

1. Prof. Fakhruddin Ahmad,
Head of the Department of Geology,
Aligarh Muslim University.
2. Dr. M. N. Viswanathiah,
Prof. & Head of the Department of Geology,
Mysore University.

9. Indian History/History

1. Dr. S. Gopal,
Chairman,
National Book Trust,
India, New Delhi.
2. Prof. Barun De,
Director,
Centre for Studies in Social Sciences,
Calcutta.
3. Prof. Bipan Chandra,
Chairman,
Centre for Historical Studies,
School of Social Sciences,
Jawaharlal Nehru University.
4. Prof. Irfan Habib,
Deptt. of History,
Aligarh Muslim University.
5. Dr. K. Rajayyan,
Professor & Head,
Department of Modern History,
Madurai University.
6. Prof. R. S. Sharma,
Prof. of History,
Delhi University.
7. Prof. Romila Thapar,
Prof. of History,
Jawaharlal Nehru University.

10. International Relations

1. Dr. K. P. Misra,
Professor and Head,
Centre for International Politics & Organisation,
School of International Studies,
Jawaharlal Nehru University.
2. Dr. Shanti Swarup,
Lajpat Rai Professor and Head,
Department of Political Science,
Punjab University.
3. Dr. M. S. Venkataramani,
Dean,
School of International Studies,
Jawaharlal Nehru University.

11. Law

1. Dr. R. C. Hingorani,
Professor and Dean,
Faculty of Law,
Patna University.
2. Prof. K. B. Rohatgi,
Dean,
Faculty of Law,
Delhi University.
3. Prof. S. N. Shukla,
Dean and Head of the Department of Law,
Allahabad University.

12. Languages

(i) *ASSAMESE*

1. Dr. Maheswar Neog,
Professor of Assamese,
Gauhati University.

(ii) *ARABIC*

1. Dr. Abdul Aleem, Director,
Taraqqi-e-Urdu Board,
Ministry of Education,
New Delhi.
2. Prof. A. H. Nadvi,
Head, Department of Arabic,
Jamia Millia Islamia,
New Delhi.

(iii) *BENGALI*

1. Dr. B. Bhattacharya,
Retired Professor of Bengali,
Calcutta University.
2. Dr. R. K. Dasgupta,
Head of the Department of Modern Indian Languages,
Delhi University.
3. Dr. S. K. Das,
Reader in Bengali,
Delhi University.

(iv) *ENGLISH LITERATURE*

1. Dr. A. K. Dhan,
Member,
Union Public Service Commission,
New Delhi.

2. Dr. Sarup Singh
Member,
Union Public Service Commission,
New Delhi.
3. Prof. V. Y. Kantak,
Central Institute of English and Foreign Languages,
Hyderabad.
4. Dr. A. N. Kaul,
Professor of English,
Delhi University.
5. Dr. (Miss) Urmilla Khanna,
Professor and Head,
Department of English,
Delhi University.
6. Shri M. Tarinayya,
Associate Professor,
School of Languages,
Jawaharlal Nehru University.

(v) *FRENCH*

1. Mrs. M. H. Paranjpe,
Associate Professor,
Centre of French Studies,
Jawaharlal Nehru University.
2. Shri S. R. Salkar,
Reader in French,
Poona University.

(vi) *GERMAN*

1. Prof. R. V. Pranjpe,
Professor of German,
Bombay University.
2. Dr. Pramod Talgeri,
Head, Centre of German Studies,
School of Languages,
Jawaharlal Nehru University.

(vii) *GUJARATI*

1. Dr. R. J. Joshi,
Reader in Gujarati,
Gujarat University.
2. Dr. R. N. Pancholi,
Reader,
M. S. University of Baroda.

(viii) *HINDI*

1. Dr. Namwar Singh,
Professor & Chairman,
Centre of Indian Languages,
Jawaharlal Nehru University.

(ii) *KANNADA*

1. Dr. L. Basava Raju,
Professor of Kannada,
Mysore University.
2. Dr. S. Vinoda Bai,
Reader in Kannada,
Delhi University.

(x) *KASHMIRI*

1. Shri D. M. Nadim,
Srinagar.
2. Prof. P. N. Pushp,
Ex-Director,
Libraries and Archives,
Research, Museums & Archaeology,
Srinagar.

(xi) *MALAYALAM*

1. Dr. K. M. George,
Visiting Fellow,
Indian Institute of Advanced Study,
Simla.
2. Dr. V. I. Subramoniam,
Professor and Head,
Department of Linguistics,
Kerala University.

(xii) *MARATHI*

1. Prof. M. V. Rajadhyaksha,
Bombay.
2. Dr. Ashok R. Kelkar,
Professor of Applied Linguistics at CASL,
Deccan College, Poona.

(xiii) *ORIYA*

1. Dr. K. Mahapatra,
Department of Modern Indian Languages,
Delhi University.

(xiv) *PERSIAN*

1. Prof. S. A. H. Abidi,
Dean, Faculty of Arts,
Delhi University.
2. Dr. Nazir Ahmed,
Professor of Persian,
Aligarh Muslim University.

(xv) *PUNJABI*

1. Dr. H. S. Gill,
•Professor of Linguistics,
Punjabi University.
2. Dr. Harbhajan Singh,
Department of Modern Indian Languages,
Delhi University.

(xvi) *RUSSIAN*

1. Prof. C. N. Chakravarti,
Centre of Russian Studies,
Jawaharlal Nehru University.
2. Prof. G. Mukerjee,
Head,
Department of Modern European Languages,
Delhi University.

(xvii) *SANSKRIT*

1. Dr. G. Bhattacharya,
Professor of Sanskrit,
Kurukshetra University.
2. Dr. S. K. Varma,
Reader in Sanskrit,
Delhi University.

(xviii) *SINDHI*

1. Dr. M. K. Jetley,
Lecturer in Sindhi,
Delhi University.

(xix) *TAMIL*

1. Prof. S. Agesthalingom,
Director,
Centre of Advanced Study in Linguistics,
Annamalai University.
2. Shri K. Arumugham,
Reader,
Delhi University.

(xx) *TELUGU*

1. Dr. K. V. Rao,
Director,
Telugu Academy,
Hyderabad.
2. Dr. C. Rama Rao,
Reader in Linguistics,
Osmania University.

(xvi) *URDU*

1. Prof. Masud Husain.
Vice Chancellor,
Jamia Millia Islamia,
New Delhi.

13. Management

1. Prof. Abad Ahmad.
Head of the Department,
Faculty of Management Studies,
Delhi University.
2. Dr. Ishwar Dayal.
(Formerly, Director,
Indian Institute of Public Administration),
National Fellow,
Indian Council of Social Science Research,
New Delhi.
3. Dr. Samuel Paul.
Director,
Indian Institute of Management,
Ahmedabad.
4. Prof. Kanti Swarup.
Prof. of Operations Research,
Indian Institute of Public Administration,
New Delhi.

14. Mathematics

1. Dr. R. P. Agarwal,
Head & Professor of Pure Mathematics,
Lucknow University.
2. Prof. R. P. Bambah,
Department of Mathematics,
Punjab University.
3. Prof. U. N. Singh,
Pro-Vice Chancellor,
Delhi University.
4. Prof. Parimal Ghosh,
Department of Mathematics,
Calcutta University.
5. Dr. S. Sinha,
Department of Mathematics,
Delhi University.
6. Prof. H. C. Gupta,
Department of Mathematics,
Delhi University.
7. Dr. M. P. Singh,
Professor of Mathematics,
Indian Institute of Technology,
Delhi.

15. Philosophy

1. Dr. N. K. Devaraja,
Professor & Head of the Department of Philosophy,
Banaras Hindu University.
2. Prof. R. C. Pandeya,
Head of the Department of Philosophy,
Delhi University.
3. Prof. K. J. Shah,
Professor & Head of the Department of Philosophy,
Karnataka University.

16. Political Science

1. Dr. P. N. Masaldan,
Head of the Department of Political Science,
Lucknow University.
2. Dr. Randhir Singh,
Head of the Department of Political Science,
Delhi University.
3. Prof. Rasheeduddin Khan, M.P.,
Dean, School of Social Sciences,
Jawaharlal Nehru University.

17. Physics

1. Dr. F. C. Auluck,
Professor of Physics,
Delhi University.
2. Prof. H. S. Hans,
Head of the Department of Physics,
Panjab University.
3. Dr. P. M. Mathews,
Professor of Theoretical Physics,
Madras University.
4. Prof. M. S. Sodha,
Dean of Post-Graduate Studies and Research,
Indian Institute of Technology, Delhi.
5. Dr. L. S. Kothari,
Professor of Physics,
Delhi University.

18. Psychology

1. Dr. S.M. Mohsin,
Retd. Professor & Head,
Department of Psychology,
Patna University.

2. Mr. H. K. Nijhawar,
Head of the Department of Psychology,
Panjab University.
3. Prof. A. S. Patel,
Head,
Department of Psychology,
M.S. University of Baroda.
4. Prof. H. C. Ganguly,
Professor of Psychology,
Delhi University.

19. Public Administration

1. Dr. B. L. Maheshwari,
Administrative Staff College,
Hyderabad.
2. Dr. S. R. Maheshwari,
Professor of Political Science,
Indian Institute of Public Administration,
New Delhi.
3. Dr. M. A. Muttalib,
Professor & Head,
Department of Public Administration,
Osmania University.

20. Sociology

1. Prof. Andre Betelle,
Professor of Sociology,
Delhi University.
2. Dr. Y. B. Damle,
Professor & Head of the Department of Sociology,
Poona University.
3. Prof. C. Parvatham,
Professor & Head of the Department of Sociology,
Mysore University.

21. Zoology

1. Prof. Sivatosh Meekerjee,
Dean, School of Life Sciences,
Jawaharlal Nehru University.
2. Prof. U. S. Srivastava,
Professor of Zoology,
Allahabad University.
3. Dr. B. I. Sundararaj,
Professor of Zoology,
Delhi University.
4. Prof. M. R. N. Prasad,
Head of the Department of Zoology,
Delhi University.

APPENDIX IX

Syllabi of Subjects recommended for inclusion in the scheme of the Civil Services Examination

PRELIMINARY EXAMINATION

COMPULSORY SUBJECTS

1. English and Indian Languages

(The syllabus of Eighth Schedule Languages and English would be common).

The aim of the paper is to test the candidate's ability to read and understand serious discursive prose, and to express his ideas clearly and correctly, in English/Indian language concerned.

The paper would be in three parts to test :—

- (i) Comprehension of given passages,
- (ii) Usage and vocabulary, and
- (iii) Ability to critically discuss given statements.

2. General Studies

The paper on General Studies will include questions covering the following fields of knowledge :—

General Science,

Current events of national and international importance.

History and Geography of India,

Indian Polity and Economy, and

Indian National Movement.

Questions on General Science should cover general appreciation and understanding of science, including matters of every day observation and experience, as may be expected of a well educated person who has not made a special study of any scientific discipline. In History, emphasis should be on broad general understanding of the subject in its social, economic and political aspects. Questions on the Geography of India should relate to physical, social and economic Geography of the country, including the main features of Indian agricultural and natural resources. Questions on Indian Polity and Economy should test knowledge on the country's political system, panchayati raj, community development and planning in India. Questions on the Indian National Movement should relate to the nature and character of the nineteenth century resurgence, growth of nationalism and attainment of Independence.

OPTIONAL SUBJECTS

1. Agriculture

Agroclimatic regions and crop distribution. Land utilization. Impact of agriculture on national economy.

Principles of pedology; classification of Indian soils, including modern concepts. Soil as a medium for plant growth: Chemical, physical and biological conditions of soil. The role of soil organic matter or humus in soil productivity. Soil-water relationships. Soil fertility etc. evaluation and maintenance through the addition of manures and fertilizers—soil testing.

Principles of plant physiology with reference to plant nutrition: absorption, translocation and metabolism of nutrients.

Diagnosis of deficiencies and deficiency diseases and their remedies; photosynthesis; effect of environment on germination, growth and production.

Elements of genetics and plant breeding as applied to improvement of crops. Principles of crops production: scientific basis of various cultural practices; layout of field experiments; variations in cultural practices in different parts of the country: crop sequence, mixed cropping, cover crops in relation to conservation of soil moisture and nutrients. Package of practices for major crops such as wheat, rice, maize, jowar, gram, arhar, sugarcane, cotton, jute, potato, tea, coconut, groundnut, mustards. Farm management and economics of various types of farming.

Scope of horticulture in the country; scientific basis of different cultural practices of horticultural crops; auxins and hormones in plant growth and fruit production. Post-harvest handling of fruits; farm forestry and shelter belts.

Serious pests and diseases affecting major crops. Principles of pest control, legislation for quarantine and control: biological control; use of chemicals for the control of pests and diseases—pesticide residues and tolerance limits; concepts of integrated control of pests and diseases; proper use and maintenance of plant protection equipment; safe storage of food grains.

Elements of genetics and breeding as applied to improvement of animals. Breeds of indigenous and exotic cattle—buffalo, goat, sheep and poultry and their potential of milk, meat and wool, production; principles of animal nutrition and management; artificial insemination for improvement of cattle; fertility and sterility; economics of dairy farming, poultry farming and sheep husbandry; major diseases affecting dairy and draught animals, and poultry; animal health and hygiene.

Philosophy, objectives and principles of extension. Extension organisations at the State, district and block levels—their structure, functions and responsibilities. Methods of communication. Role of farm organisations in extension service.

2. Botany

1. ORIGIN OF LIFE—Basic ideas on the origin of earth, origin of life, chemical and biological evolution.

2. MORPHOLOGY, BASIC ANATOMY AND TAXONOMY—Elementary knowledge of structure, differentiation and function of various types of tissues and organs. Principles of nomenclature, classification, and identification of plants.

3. PLANT DIVERSITY—A general account of structure and reproduction of viruses, algae, fungi, lichens, bryophytes, pteridophytes, gymnosperms and angiosperms. Concept of alternation of generations.

4. PLANT FUNCTIONS—Elementary knowledge of photosynthesis, nitrogen metabolism, respiration, enzymes, mineral nutrition and water relations.

5. PLANT GROWTH AND DEVELOPMENT—Dynamics of growth and growth hormones. Physiology of flowering and seed germination.

6. REPRODUCTION—Sexual and asexual reproduction. Mechanism of pollination and fertilization. Development of seed.

7. CELL BIOLOGY—Cell structure and function of organelles. Mitosis and meiosis.

8. GENETICS—Concept of gene, laws of inheritance, mutation, and polyploidy. Genetics and plant improvement.

9. EVOLUTION—A general account.

10. PLANT PATHOLOGY—A general account of important diseases of crop plants of India and their control.

11. PLANTS AND HUMAN WELFARE—Role of plants in human life. Importance of plants yielding food, fibres, wood and drugs.

12. PLANTS AND ENVIRONMENT—A general account of vegetation of India. An elementary knowledge of ecosystems.

3. Chemistry

1. Inorganic Chemistry

Atomic Number, Electronic configuration of elements. Aufbau Principle, Hund's Multiplicity Rule, Pauli's Exclusion Principle, Long Form of periodic classification of elements. Transition elements and their salient characteristics.

Atomic and ionic radii, ionization potential, electron affinity and electronegativity.

Natural and artificial radioactivity. Nuclear fission and fusion.

Electronic Theory of valency. Elementary ideas about sigma and pi-bonds, hybridization and directional nature of covalent bonds.

Oxidation states and oxidation number. Common oxidising and reducing agents. Ionic equations.

Bronsted and Lewis theories of acids and bases.

Chemistry of the common elements and their compounds treated especially from the point of view of periodic classification. Principles of extraction, isolation of common elements.

Werner's theory of coordination compounds. Electronic configurations of complexes involved in the common metallurgical and analytical operations.

Structures of hydrogen peroxide, persulfuric acids, diborane, aluminium chloride and the important oxyacids of nitrogen, phosphorus, chlorine and sulphur.

Inert gases: Isolation and chemistry.

Principles of inorganic chemical analysis.

Outlines of the manufacture of : Sodium carbonate, sodium hydroxide, ammonia, nitric acid, sulphuric acid, cement, glass and artificial fertilisers.

2. Organic Chemistry

Modern concepts of covalent bonding. Electron displacements—inductive, mesomeric and hyperconjugative effects. Effect of structure on dissociation constants of acids and bases. Resonance and its applications to organic Chemistry. Principles of organic reaction mechanisms, addition nucleophilic and electrophilic substitution.

Alkanes, alkenes and alkynes. Petroleum as a source of organic compounds. Simple derivatives of aliphatic compounds: Alcohols, aldehydes, Ketones, acids, halides, esters, ethers, amines, acid anhydrides, chlorides and amides. Monobasic hydroxy. Ketonic and amino acids. Malonic and acetoacetic esters, unsaturated and dibasic acids. Lactic, tartaric citric, maleic and fumaric acids. Carbohydrates: classification and general reactions. Glucose, fructose and sucrose. Organometallic compounds. Grignard reagents.

Stereochemistry: Optical and geometrical isomerism. Concept of conformation.

Benzene and its simple derivatives : Toluene, xylenes, phenols, halides, nitro and amino compounds. Benzoic, salicylic, cinnamic, mandelic and sulphonic acids. Aromatic aldehydes and ketones. Diazo, azo and hydrazo compounds : Aromatic substitution. Naphthalene, pyridine and quinoline : Synthesis, structure and simple reactions. Simple Chemistry of economically important materials, e.g. Coal Tar, cellulose, starch, oils, fats, proteins and vitamins.

3. Physical Chemistry

Kinetic theory of gases and gas laws. Maxwell's law of distribution of velocities. Van der Waal's equation. Law of corresponding states, Liquefaction of gases. Specific heats of gases, Ratio of C_p/C_v .

Thermodynamics; the first law of the thermodynamics. Isothermal and adiabatic expansions, Enthalpy, Heat capacities. Thermochemistry. Heats of reaction, formation, solution and combustion. Calculation of bond energies. Kirchoff's equation.

Criteria for spontaneous change. Second law of Thermodynamic, Entropy, Free energy, Criteria of Chemical equilibrium.

Solutions, Osmotic pressure, lowering of vapour pressures, depression of freezing point, elevation of boiling point. Determination of molecular weights in solution. Association and dissociation of solutes.

Chemical equilibria. Law of mass action and its application to homogeneous and heterogeneous equilibria. Le Chatelier principle and its applications to chemical equilibrium.

Chemical Kinetics : Molecularity and order of a reaction. First order and second order reactions. Determination of order of a reaction, temperature coefficients and energy of activation, Collision theory of reaction rates. Activated complex theory.

Electrochemistry : Faraday's laws of electrolysis; conductivity of an electrolyte; equivalent conductivity and its variation with dilution; solubility of sparingly soluble salts; electrolytic dissociation. Ostwald's dilution law; anomaly of strong electrolytes; solubility product, strength of acids and bases; hydrolysis of salts; hydrogenation concentration; buffer action; theory of indicators.

Reversible cells. Standard hydrogen and calomel electrodes. Electrodes and redox-potentials. Concentration cells. Determination of pH. Transport number. Ionic product of water. Potentiometric titrations.

Phase rules : Explanation of the terms involves. Application to one and two components systems. Distribution Law.

Colloids: General nature of colloidal solutions and their classification; general methods of preparation and properties of colloids. Coagulation. Protective action and gold number. Absorption.

Catalysis : Homogeneous and heterogeneous catalysis. Promoters. Poisoning.

Photochemistry : Laws of photochemistry. Simple numerical problems.

Simple numerical and conceptual problems based on the full syllabus.

4. Commerce

Part I

The Accounting entries and the Double Entry System—The accounting process culminating in the preparation of final statements : Income Statement and Balance Sheet—Partnership Accounts and Company Accounts—Accounts of non-profit organisations—Financial reporting under the Indian

Companies Act. Use of machines in accounting. Basic Accounting Concepts : Concepts of Income, Expenditure (revenue and capital) cost, expense, inventory valuation, depreciation, Profit, Reserves, Provisions—Operating and non-Operating Income & Expenses. A clear understanding of each item appearing in the balance sheet : Current Assets, Current Liabilities, Gross and Net Working Capital, Cash Credit and Trade Credit, Public Deposits, Inter-company Loans, Terms loans and bonds, Deferred Payment facility, Preference Capital, Convertible Securities, Equity, Capital Reserve, Free Reserves, Development Rebate Reserve, Accumulated Depreciation Reserves.

Objects of auditing. Audit under Statute. Audit of proprietary and partnership firms. Company audit in broad outlines.

Part II

Business Organisation and Secretarial Practice. Nature and purpose of business. Forms of organisation. Setting up a business. Legal and procedural aspects—Financing of a business enterprise. The firm's need for finance, fluctuating character of the need, types of finance. Types of securities and methods of issue—Nature and functions of Internal management. Types of organisation. Delegation of authority. Important functions of modern office. Relationship of office with other departments. Centralization vs. decentralization. Industrial relations—Foreign Trade—Organisation, procedure and financing of import and export trade—Principles of insurance. Fire and marine policies.

Provision of the Indian Companies Act regarding formation, management and raising capital of Joint Stock Companies—Duties of a Company Secretary regarding incorporation of Companies, Statutory books, company meetings and payment of dividends—conversion of private into public limited companies—Office systems and routines.

5. Economics

Part I

1. *National income and its components.*
2. *Price Theory :* Consumer's equilibrium with the help of utility and indifference curve techniques; equilibrium of the firm and determination of prices under different market structures; pricing of factors of production.
3. *Money and Banking :* Meaning, functions and definition of money—money supply including the process of credit creation—credit : meaning, sources cost and availability.
4. *International Trade :* The theory of comparative costs and balance of payments and the adjustment mechanism.

Part II

Economic Growth and Development : Meaning and measurement; characteristics of underdevelopment; characteristics, conditions, rate and time pattern of modern economic growth.

Part III

Indian Economics : India's economy since Independence : The general trends and problems, planning in India; Objectives of Planning; Strategy of Indian Planning, Rate and Pattern of investment in Five-Year Plans—Problems of resource mobilization; domestic and external; Evaluation of progress under the plans.

6. (i) Civil Engineering

Statics : Coplanar and multiplanar systems; free body diagrams; centroid; second moment of plane figures; force and funicular polygons; principle of virtual work; suspension systems and catenary.

Dynamics : Units and dimensions; Gravitational and absolute systems; MKS & S.I. Units.

Kinematics : Rectilinear and Curvilinear motion; relative motion; instantaneous centre.

Kinetics : Mass moment of inertia; simple harmonic motion; momentum and impulse; equation of motion of a rigid body rotating about a fixed axis.

Strength of Materials : Homogeneous and isotropic media; stress and strain; elastic constants; tension and compression in one direction; riveted and welded joints.

Compound stresses—Principal stresses and principal strains; simple theories of failure.

Bending moments and shear force diagrams.

Theory of bending; shear stress distribution in cross-section of beams; Deflection of beams.

Analysis of laminated beams; and non-prismatic structures.

Theories of columns: middle third and middle fourth rules.

Three pinned arch; analysis of simple frames, Torsion of shafts; combined bending, direct and torsional stresses in shafts.

Strain energy in elastic deformation; impact, fatigue and creep.

Soil Mechanics :

Origin of soils, classification; void ratio, moisture content; permeability; compaction.

Seepage ; construction of flow nets.

Determination of shear strength parameters for different drainage and stress conditions—Triaxial, unconfined and direct shear tests.

Earth pressure theories—Rankine's and Coulomb's analytical and graphical methods; stability of slopes.

Soil consolidation—Terzaghi's theory for one dimensional consolidation; rate of settlement and ultimate settlement, effective stress; pressure distribution in soils; soil stabilization.

Foundations—Bearing capacity of footings, piles, wells, sheet piles.

Fluid Mechanics :

Properties of Fluids.

Fluid Statics—Pressure at a point; forces on plane and curved surfaces; buoyancy—Stability of floating and submerged bodies.

Dynamics of Fluid Flow—Laminar and turbulent flow; equation of continuity; energy and momentum equation; Bernoulli's theorem; cavitation.

Velocity potential and stream function; rotational and irrotational flow; vortices; flow net.

Fluid flow measurement.

Dimensional analysis—Units and dimensions; non-dimensional numbers; Buckingham's pi-theorem, principles of similitude and application.

Viscous flow—Flow between static plates and circular tubes; boundary layer concepts; drag and lift.

Incompressible flow through pipes—Laminar and turbulent flow; critical velocity; friction loss; loss due to sudden enlargement and contraction; energy grade lines.

Open channel flow—uniform and non-uniform flow; specific energy and critical depth; gradually varied flow; surface profiles; standing wave flume. Surges and waves.

Surveying :

General principles; sign conventions; surveying instruments and their adjustments; recording of survey observations; plotting of maps and sections; errors and their adjustments.

Measurement of distances, directions and heights; correction to measured lengths and bearings; correction for local attractions; measurement of horizontal and vertical angles; levelling operations; refraction and curvature corrections.

Chain and compass survey; theodolite and tacheometric traversing; traverse computation; plane table survey; solution of two and three points problems; contour surveying.

Setting out directions and grades; types of curves, setting out of curves and excavation lines for building foundations.

6. (ii) Electrical Engineering

Primary and secondary cells, Dry accumulators, Solar cells. Steady state analysis of d.c. and a.c. networks; network theorems, network functions, Laplace techniques, transient response; frequency response; three-phase networks; inductively coupled circuits.

Mathematical modelling of dynamic linear systems, transfer functions, block diagrams; stability of control systems.

Electrostatic and magnetostatic field analysis, Maxwell's equations, wave equations and electromagnetic waves.

Basic methods of measurements, standards, error analysis; indicating instruments, cathode-ray oscilloscope; measurement of voltage, current; power, resistance, inductance, capacitance, frequency, time and flux; electronic meters.

Vacuum based and Semiconductor devices and analysis of electronic Circuits; single and multistage audio and radio small signal and large signal amplifiers; Oscillators and feedback amplifiers; waveshaping circuits and time base generators; multivibrators and digital circuits; modulation and demodulation circuits.

Transmission line at audio, radio and U.H. frequencies; Wire and Radio communication.

Generation of e.m.f., m.m.f. and torque in rotating machine; motor and generator characteristics of d.c., synchronous and induction machines, equivalent circuits; commutation, starters; phasor diagram, losses, regulation; power transformers.

Modelling of transmission lines, steady state and transient stability, surge phenomena and insulation coordination; protective devices and schemes for power system equipment.

Conversion of a.c. to d.c. and d.c. to a.c. controlled and uncontrolled power; speed control techniques for drives.

6. (iii) Mechanical Engineering

<i>Statics :</i>	Simple applications of equilibrium equations.
<i>Dynamics :</i>	Simple applications of equations of motion. Simple harmonic motion. Work, energy, power.
<i>Theory of Machines :</i>	Simple examples of links and mechanisms. Classification of gears, standard gear tooth profiles. Classification of bearings. Function of flywheel. Types of governors. Static and dynamic balancing. Simple examples of vibration of bars. Whirling of shafts.
<i>Mechanics of Solids :</i>	Stress, strain, Hooke's Law, elastic moduli. Bending moment and shearing force diagrams for beams. Simple bending and torsion of beams. Springs, thin-walled cylinders. Mechanical properties and material testing.
<i>Manufacturing Science :</i>	Mechanics of metal cutting, tool life, economics of machining, cutting tool materials. Basic machining processes, types of machine tools, transfer lines, shearing, drawing, spinning, rolling, forging, extrusion. Different types of casting and welding methods.
<i>Production Management :</i>	Method and time study, motion economy and work space design, operation and flow process charts. Product design and cost selection of manufacturing process. Break even analysis. Site selection. Plant layout. Materials handling. Selection of equipment for job shop and mass production. Scheduling, despatching, routing.

<i>Thermodynamics :</i>	Heat, work and temperature. First and second laws of thermodynamics. Carnot, Rankine, Otto and Diesel cycles.
<i>Fluid Mechanics :</i>	Hydrostatics. Continuity equation. Bernoulli's theorem. Flow through pipes. Discharge measurement. Laminar and turbulent flow. Concept of boundary layer.
<i>Heat Transfer :</i>	One dimensional steady state conduction through walls and cylinders. Fins. Concept of thermal boundary layer. Heat transfer coefficient. Combined heat transfer coefficient. Heat exchangers.
<i>Energy Conversion :</i>	Compression and spark ignition engines. Compressors, fans and blowers. Hydraulic pumps and turbines. Thermal turbo-machines. Boilers. Flow of steam through nozzles. Layout of power plants.
<i>Environmental Control :</i>	Refrigeration cycles, refrigeration equipment—its operation and maintenance, important refrigerants, Psychrometrics comfort, cooling and dehumidification.

7. Geography

Section A

- (i) Locational Aspects—India.
- (ii) Locational Aspects—World.

Section B

Physical basis of Geography—Questions relating to

- (i) Topographical features.
- (ii) Elements of climate.
- (iii) Soils and vegetation.

Section C

World Economic Geography—Covering the following Aspects

- (i) Agriculture.
- (ii) Mineral and Power resources.
- (iii) Industries.

Section D

World Regional Geography—Questions relating to

(i) Natural regions of the world.

(ii) Regional Geography of the following:—

Africa/South-East Asia/S.W. Asia,

Western Europe/North America.

USSR/Eastern Europe/China.

Australia/Japan/Latin America.

8. Geology

Part I

Physical Geology.—Origin, structure and age of the Earth; Geological agents—hypogene and epigene, processes of weathering, atmosphere, hydrosphere and lithosphere and their constituents; Volcanoes, earthquakes, geosynclines and mountains; continental drift.

Geomorphology.—Basic concepts of geomorphology and typical land-forms.

Structural and Field Geology.—Dip and strike; Clinometer compass and its use. Folds, faults, joints and unconformities—their description, classification recognition in the field and their effects on outcrops. Outliers and inliers. Nappes and windows. Elementary ideas of geological surveying and mapping—use of contour and topographical maps.

Part II

Crystallography.—Elements of crystal forms and symmetry. Laws of crystallography. Crystal systems and classes. Crystal habits and twinning.

Mineralogy.—Principles of optics, refractive index, Birefringence, pleochroism and extinction. Use of simple polarising microscope. Physical, chemical and optical properties of minerals. Study of more common rock forming minerals—feldspars, quartz, amphiboles, pyroxenes, chlorites, micas, garnets, carbonates, etc.

Economic Geology.—Outline of processes of formation of ore deposits; origin, mode of occurrence, distribution (in India) and economic uses of the following minerals and ores; gold, iron, copper, manganese, aluminium, lead and zinc, coal, petroleum, mica, gypsum.

Part III

Petrology.—Classification of rocks. Important rock types of India.

Forms, structures, textures and classification of igneous rocks. Common igneous rocks of India, and their petrographic characters. Magma—its composition, constitution and differentiation.

Origin, classification, structural, textural and mineralogical characters of sedimentary rocks. Primary structures of sedimentary rocks.

Metamorphism—agents, kinds and grades of metamorphism. Classification, structures and textures of metamorphic rocks.

Part IV

Stratigraphy.—Principles of stratigraphy. Chronological subdivisions. Outlines of Indian stratigraphy.

Palaeontology.—Fossils nature, mode of preservation, and uses, Study of important genera of invertebrate; and plants *e.g.* brachiopodes, gastropods, ammonites, corals, trilobites and echinoides. Gondwana flora.

9. Indian History

Section A

1. Foundations of Indian Culture and Civilisation
Indus Civilisation.
Vedic Culture.
Sangam Age.
2. Religious Movements :
Buddhism.
Jainism.
Bhagavatism and Brahmanism.
3. The Maurya empire.
4. Trade & Commerce in the pre-Gupta and Gupta period.
5. Agrarian structure in the post-Gupta period.
6. Changes in the social structure of ancient India.

Section B

1. Political and social conditions, 800—1200. The Cholas.
2. The Delhi Sultanate : Administration, Agrarian conditions.
3. The provincial Dynasties. Vijayanagar Empire : Society and administration.

4. The Indo-Islamic-culture. Religious movements, 15th and 16th centuries.
5. The Mughal Empire (1556—1707). Mughal polity; agrarian relations: Art, architecture and culture under the Mughals.
6. Beginnings of European commerce.
7. The Maratha Kingdom and Confederacy.

Section C

1. The decline of the Mughal Empire; the autonomous states with special reference to Bengal, Mysore and Punjab.
2. The East India Company and the Bengal Nawabs.
3. British Economic Impact in India.
4. The Revolt of 1857 and other popular movements against British rule in the 19th century.
5. Social and cultural awakening; the lower caste, trade union and the peasant movements.
6. The Freedom struggle.

10. Law

1. *Jurisprudence*.—Concept and Theory of Law (Imperative, Natural and Realist Theories); Sources of Law; Legal Rights and Duties; Possession and Ownership; Legal Personality.
2. *Constitutional Law of India*.—Preamble; Directive Principles of State Policy; Fundamental Rights; President and his powers.
3. *Law of Contract*.—General Principles of Contract (Section 1 to 75 of the Indian Contract Act, 1872).
4. *International Law*.—Nature, Sources, State Recognition and United Nations Organisation; International Court of Justice.
5. *Torts and Crimes*.—Nature of Tortious and Criminal Liability; Vicarious Liability and State Liability.

11. Mathematics

Algebra.—Development of number systems : Natural numbers, Integers, Rational number, Real & Complex numbers, Division algorithm, greatest common divisor, Polynomials, Division algorithm, derivations; Integral, rational, real and complex roots of a polynomial, relation between roots and coefficients, repeated roots, elementary symmetric functions, numerical methods of solution of algebraic equations, cubic and the quartic (Cardan's method).

Matrices.—Addition and multiplications, elementary row and column operations, rank; determinants, solutions of systems of linear equations.

Calculus.—Real numbers, order completeness property, standard functions, limits, continuity, properties of continuous functions in closed intervals, differentiability, Mean value Theorem, Taylor's Theorem, Maxima and Minima, Application to curves—tangent normal properties, Curvature, asymptotes, double points, points of inflexion and tracing.

Definition of a definite integral of a continuous function as the limit of a sum, fundamental theorem of integral calculus, methods of integration, Rectification, quadrature, volume; and surfaces of solids of revolution.

Partial differentiation and its applications, Double and Triple Integration, Application to area, volume, centre of mass, moment of inertia etc., Simple tests of convergence of series of positive terms, alternating series and absolute convergence.

Differential Equations.—First order differential equations. Singular solutions,* geometrical interpretations; linear differential equations with constant coefficients.

Geometry.—Analytical Geometry of straight lines and conics referred to Cartesian and polar coordinates; Three dimensional geometry for planes, straight lines, sphere and cone.

Mechanics.—Concept of particle, lamina, rigid body, displacement, force, mass, weight; concept of scalar and vector quantities, Vector Algebra, combination and equilibrium of coplanar forces. Newton's laws of motions limitations of Newtonian mechanics, motion of a particle in a straight line and on a plane.

12. Philosophy

Deductive and Inductive logic, with special reference to mediate and immediate inferences, fallacies, definition, division, connotation and denotation; elements of truth-functional logic; scientific method, hypothesis and its confirmation.

History and theory of Ethics, Indian and Western. Western Ethics, with special reference to the problems of Moral Standards and their application; Moral Judgement, Determinism and Free Will; Moral Order and Progress; relation between Individual, Society and the State; theories of Crime and Punishment, and relation of Ethics to Religion. Indian Ethics, with special reference to Purusharthas, Varnashrama and Sadaharana Dharmas, and Karma and Rebirth.

History of Western Philosophy, with special reference to nature of Philosophy and its relation to Science and Religion; theories of Matter, Spirit, Space, Time, Causation, Evolution, Value and God. History of Indian Philosophy (including orthodox and heterodox systems), with special reference to theories of God, Self, Liberation, Causation, Pramanas and Error.

13. Political Science

Section A (Theory)

1. (a) THE STATE.—Sovereignty; Pluralist theory of Sovereignty;
 (b) Theories of the Origin of the State (Social Contract, Historical-Evolutionary, and Marxist);
 (c) Theories of the functions of State (Liberal-Welfare and Socialist).
2. (a) CONCEPTS.—Rights, Property, Liberty, Equality, Justice;
 (b) DEMOCRACY.—Electoral Process; Theories of Representation: Public Opinion; Parties and Pressure Groups;
 (c) POLITICAL THEORIES.—Liberalism; Evolutionary Socialism (Fabian & Democratic); Marxian Socialism, Fascism.

Section B (Government)

1. GOVERNMENT : Constitution and Constitutional Govt.; Parliamentary and Presidential Government; Federal and Unitary Government.
2. INDIA :
 (a) Colonialism and Nationalism in India: the nature of anti-imperialist struggle.
 (b) The Indian Constitution : Fundamental Rights, Directive Principles of State Policy and Judicial Review.
 (c) Indian Federalism : Centre-State Relations; Parliamentary Government in India.
3. UNITED KINGDOM : The Rule of Law and Cabinet Government.
4. U.S.A. : The Presidency, the Senate, the Supreme Court and Judicial Review.
5. SWITZERLAND : Direct democracy.
6. U.S.S.R. Federalism; the Role of the Communist Party.

14. Physics

Mechanics :

Units and dimensions, S I units. Newton's Laws of motion, conservation of linear and angular momentum, projectiles, rotational motion, moment of inertia, rolling motion, Newton's law of gravitation, planetary motion, artificial satellites. Fluid motion, Bernoulli's theorem, Surface tension, Viscosity. Elastic Constants, bending of beams, torsion of cylindrical bodies. Elementary ideas of special theory of relativity.

Thermal Physics :

Thermometry. Zeroth, first and second laws of thermodynamics, heat engines, Maxwell's relations. Kinetic theory of gases, Brownian motion, Maxwell's velocity distribution, equipartition of energy, mean free path, transport phenomena. Van der Waals' equation of state. Liquefaction of gases. Blackbody radiation, Planck's law. Conduction in solids.

Waves and Oscillations :

Simple harmonic motion; wave motion; superposition principle. Damped oscillations; forced oscillations and resonance; simple oscillatory systems; vibrations of rods, strings and air columns. Doppler effect. Ultrasonics. Reverberation and Sabine's law. Recording and reproduction of sound.

Optics :

Nature and propagation of light; Interference; diffraction; polarisation of light; simple interferometers. Determination of wavelength of spectral lines. Electromagnetic spectrum. Rayleigh scattering, Raman effect.

Lenses and mirrors; combination of coaxial thin lenses; Spherical and chromatic aberrations and their correction. Microscopes. Telescope. Eye-pieces. Projectors. Photometry.

Electricity and Magnetism :

Electric charge, fields and potentials. Gauss's theorem. Electrometers. Dielectrics. Magnetic properties of matter and their measurement. Elementary theory of dia, para and ferro magnetism; hysteresis. Electric currents and their properties. Galvanometers. Wheatstone's bridge and applications. Potentiometers. Faraday's laws of E.M. induction, Self and mutual inductance and their applications; alternating currents, impedance, and resonance; L-C-R circuits. Dynamos; motors; transformers. Seebeck, Peltier and Thomson effects and applications; electrolysis, Hall effect. Hertz experiment and electromagnetic waves. Particle accelerators, cyclotron.

Atomic Structure :

Electron—measurement of e and e/m . Measurement of Planck Constant. Rutherford—Bohr atom. X-rays, Bragg's law, Mosely's law. Radioactivity. α , β and γ emissions. Elementary ideas of nuclear structures. Fission and fusion, reactors. De Broglie waves. Electron Microscope.

Electronics :

Thermionic emission, diodes and triodes, p-n diodes and transistors. simple rectifier, amplifier and oscillator circuits.

15. Psychology

1. Subject-matter, methods and fields of Psychology.
2. Genetic factors in human developments:
 - nature and nurture
 - effector, adjustor and
 - effector mechanisms.

3. Motivation and emotion :

- definition and classification of motives
- conflict of motives and frustration
- nature of emotions and their physiological
- correlates and expressions.

4. Learning :

- its nature : conditioning, sensory-motor learning, verbal learning
- factors influencing learning
- transfer of training.

5. Remembering and forgetting :

- its nature
- factors influencing retention.

6. Perception :

- its nature
- perceptual organisation
- perception of form and colour
- perceptual constancy, illusions.

7. Thinking :

- its nature
- concept formation
- problem solving
- creative thinking.

8. Intelligence :

- its nature
- types of tests of intelligence.

9. Personality :

- its nature and determinants
- tests of personality.

10. Process of socialization

11. Group :

- its structure and functions
- types of group-membership.

12. Leadership :

- its characteristics and style.

13. Attitudes :

—its nature

—change of attitudes.

14. Social change.

15. Social perception.

16. Abnormality ; its criteria.

17. Defence mechanisms.

18. Types of mental disorders : psychoneurosis and psychosis.

(a) Psychoneurosis : Anxiety neurosis, Hysteria, obsession—compulsion, phobia.

(b) Psychosis : Schizophrenia, paronide reaction, manic-depressive.

16. Sociology

Concepts : Society, culture; status, role; groups; primary group, secondary group, reference groups; institution; structure and function; norms and values; sanctions, deviance; social processes : assimilation, integration, co-operation, competition and conflict.

Institutions : Marriage, family, kinship; economic political and religious institutions.

Social Stratification : Caste, class and state.

Social Structure : Village, town, city.

Types of Society : Tribal, agrarian, industrial.

17. Zoology

1. *Cell structure and function*.—Structure of an animal cell; nature and function of cell organelles; mitosis and meiosis; chromosomes and genes.

2. *General survey and Classification of non-chordates (up to sub-classes) and chordates (up to orders) of*.—Protozoa, Porifera, Coelenterata, Platyhelminthes, Aschelminthes, Annelida, Arthropoda, Mollusca, Echinodermata and Chordata.

3. *Functional morphology*.—Reproduction and life history of the following types:—

Amoeba, *Euglena*, *Monocystis*, *Plasmodium*, *Paramecium*, *Sycon*, *Hydra*, *Obelia*, *Fasciola*, *Taenia*, *Ascaris*, *Nereis*, *Planorbis*, leech, crustacean (crab, prawn or shrimp), scorpion, centipede, a bivalve, a snail.

Balanoglossus, *Ascidian*, *Amphioxus*.

4. *Comparative anatomy* of vertebrates.—Integument, endoskeleton, locomotory organs, digestive system, respiratory system, heart and circulatory system, urinogenital system and sense organs.
5. *Physiology*.—Chemical composition of protoplasm; nature and function of enzymes; colloids and hydrogen ion concentration; biological oxidation. Elementary physiology of digestion, excretion, respiration, blood, mechanism of circulation, with special reference to man; physiology of nerve impulse.
6. *Embryology*.—Gametogenesis, fertilization, parthenogenesis, neoteny, metamorphosis, embryology of Branchiostoma, frog and chick. Function of foetal membranes in mammals.
7. *Evolution*.—Origin of life. Principles and evidences of evolution: speciation; mutation and isolation.
8. *Ecology*.—Biotic and abiotic factors; concept of ecosystem; food chain and energy flow; adaptation of aquatic and desert fauna; parasitism and symbiosis; elementary idea of factors causing environmental pollution.

MAIN EXAMINATION

The Main Examination is intended to assess the overall intellectual traits and depth of understanding of candidates rather than merely the range of their information and memory. Sufficient choice of questions would be allowed to the candidates in the question papers.

The scope of the syllabus for the optional subject papers for the examination is broadly of the honours degree level *i.e.* a level higher than the bachelors degree and lower than the masters degree. In the case of the Engineering and law, the level corresponds to the bachelors degree.

COMPULSORY SUBJECTS

1. English and Indian Languages

Candidates would be required to answer questions designed to test their understanding of the language and workman-like use of words. Some of the questions will be devised to test their reasoning power, capacity to think constructively and to perceive implications. Credit will be given for concise and effective expression.

The pattern of the questions would be broadly as follows:—

- (i) Two self-contained passages, of not more than 300 words each, to test comprehension of the ideas and the language of the passages.
- (ii) Precis of a given passage (about 750 words).
- (iii) Two given speeches (taken from a debate) for comparison of ideas and personalities (of speakers).
- (iv) "Constructive Thinkings"—an answer to a question which presents a problem.

2. Essay

The candidates would be required to write an essay from a wide range of subjects, in any one of the Eighth Schedule languages or in English. They will be expected to keep closely to the subject of the essay to arrange their ideas in orderly fashion, and to write concisely. Credit will be given for effective and exact expression.

3. General Studies

General Studies Paper I and Paper II will cover the following areas of knowledge—

PAPER I

- (1) Modern History of India and Indian culture.
- (2) Current events of national and international importance.
- (3) Statistical analysis, graphs and diagrams.

PAPER II

- (1) Indian polity;
- (2) Indian economy and Geography of India; and
- (3) The role and impact of science and technology in the development of India.

In Paper I, Modern History of India and Indian Culture will cover the broad history of the country from about the middle of the nineteenth century and would also include questions on Gandhi, Tagore and Nehru. The part relating to statistical analysis, graphs and diagrams will include exercises to test the candidate's ability to draw commonsense conclusions from information presented in statistical, graphical or diagrammatical form and to point out deficiencies, limitations or inconsistencies therein.

In Paper II, the part relating to Indian Polity, will include questions on the political system in India. In the part pertaining to the Indian Economy and Geography of India, questions will be put on planning in India and the physical, economic and social Geography of India. In the third part relating to the role and impact of science and technology in the development of India, questions will be asked to test the candidate's awareness of the role and impact of science and technology in India; emphasis will be on applied aspects.

OPTIONAL SUBJECTS

I. Agriculture

PAPER I

Clay mineralogical concept of soil fertility. Interaction between soil and fertilisers; transformation of nitrogen, fixation of phosphorus, potassium and zinc. Use of radioisotopes in the study of soil fertility and crop growth. Physicochemical principles underlying the formation and amelioration of saline, alkaline and acid soils. Moisture retention characteristics of various types of soil. Soil moisture constants. Soil-plant-water relationship, moisture deficit and salt stress conditions. Agrobiological principles: soil test-crop response relationships. Soil and moisture conservation and dry land agriculture.

Interpretation of weather data and weather forecast. Interaction of weather and climate with Soil and crop. Concept of minimum tillage. Water use efficiency in relation to critical stages of crop growth. Scheduling of crops as influenced by the amount and source of water. Crop rotation as a means to optimise and maintain soil fertility. Competitive effects of weeds on growth, yield and quality of crops. The concepts of economic and optimum production of crops.

Auxins and hormones—their transport and physiological role in plants. The action of auxins and hormones in growth, development and fruiting of horticultural crops.

Incidence of pests and diseases of crops as influenced by climatic and biological conditions. Principles of bioecological control of pests and diseases; insects as vectors of plant viruses; prophylactic measures against diseases and pests. Bioassay of pesticides.

Fodder and feed—their biological conversion in different animals.

Genetic and environmental factors determining the quality and quantity of milk, meat, wool and egg. The role of dairy and poultry farming in providing employment in the rural sector; recycling of organic wastes at the farm. An account of the improvement of cattle and poultry in India.

PAPER II

Inheritance of characters in plants and animals and the laws governing them. The gene concept; heterosis.

Breeding of animals and plants for better quality and disease and draught resistance.

The technology of production of processing and storage of seeds of improved varieties of crops.

Physiology of nutrition of monogastric animals and ruminants. Principles underlying the devising of rations for milch and draught cattle. Composition of foodgrains, milk, meat and egg in relation to human nutrition. Fruits and vegetables as protective foods.

Pricing of agricultural inputs and outputs and marketing of commodities. Price fluctuations and their causes. Role of cooperatives in agricultural economy. Farm planning, budgeting and accounting. Statistical design, analysis and interpretation of data obtained from field experiments.

Methods of evaluating extension programmes. Conduction of socio-economic survey and interpretation of data regarding status and attitude of big, small and marginal farmers and landless agricultural labourers. Farm mechanisation and its impact on rural employment; updating of knowledge of extension workers.

2. Botany

PAPER I

Microbiology, Pathology, Plant Groups; Morphology, Anatomy, Taxonomy, and Embryology of Angiosperms; Morphogenesis.

1. *Microbiology*—Viruses and Bacteria—structure, classification, reproduction and physiology. General account of infection, immunity and serology. Microbes in industry and agriculture.

2. *Pathology*—Knowledge of important plant diseases in India caused by viruses, bacteria and fungi. Mode of infection and methods of control, physiology of parasitism.

3. *Plant Groups*—Structure, reproduction, life-history, classification, evolution, ecology, and economic importance of algae, fungi, bryophytes, pteridophytes, and gymnosperms. A general knowledge of the distribution in India of important representatives of principal sub-divisions of the above groups.

4. *Morphology, anatomy, embryology, and Taxonomy of Angiosperms*—Tissues and tissue systems. Morphology and anatomy of stem, root, leaf, flower and seed (including developmental aspects and anomalous growth). Structure of anther and ovule, fertilization and development of seed. Principles of nomenclature and classification of angiosperms. Modern trends in Taxonomy. A general knowledge of the more important families of angiosperms.

5. *Morphogenesis*—Phenomena of morphogenesis—Polarity, symmetry, cellular and organ differentiation. Factors of morphogenesis. Methodology and application of tissue culture studies.

PAPER II

Cell Biology, Genetics & Evolution, Physiology, Ecology and Economic Botany.

1. *Cell Biology*—Cell as a unit of structure and function. Ultra-structure, function and inter-relationships of plasma membranes, endoplasmic reticulum, Golgi apparatus, mitochondria, ribosomes, chloroplasts, and nucleus. Chromosomes—chemical and physical nature, behaviour during mitosis and meiosis, numerical and structural variations.

2. *Genetics and Evolution*—Pre and post-Mendelian concept of genetics. Development of the gene concept. Nucleic acids—their structure and role in reproduction and protein synthesis. Genetic code and regulation. Mechanism of microbial recombination. Mutation. Elements of human genetics. Organic evolution—evidence, mechanism and theories.

3. *Physiology*—Photosynthesis—history, factors, mechanism and importance. Absorption and conduction of water and salts. Transpiration. Major and minor essential elements and their role in nutrition. Nitrogen fixation and nitrogen metabolism. Enzymes. Respiration and fermentation. General account of growth. Plant hormones and their functions. Photoperiodism. Seed dormancy and germination.

4. *Ecology*—Scope of ecology. Structure, function and dynamics of ecosystems. Plant communities and succession. Ecological factors. Applied aspects of ecology including conservation and control of pollution.

5. *Economic Botany*—Origin and importance of cultivated plants. General count of important sources of food, fibre, wood and drugs.

Chemistry

NOTE :—The students will be expected to solve simple structural, synthetic, mechanistic, conceptual and numerical problems based on and relevant to the syllabus. They are also expected to be acquainted with the SI units.

PAPER I

Atomic Structure and Chemical Bonding—Quantum theory, Schrodinger equation, particle in a box, hydrogen atom. Hydrogen molecule ion, hydrogen molecule. Elements of valence bond and molecular orbital theories (idea of bonding, non-bonding and antibonding orbitals). Sigma and Pi bonds.

Molecular Structure Determination—Diffraction methods (X-ray and electron). Dipole moments and magnetic properties.

Molecular Spectra:

NMR, chemical shift, spin-spin coupling

ESR of simple radicals

Rotational spectra: diatomic molecules, linear triatomic molecules, isotopic substitution

Vibrational and Raman spectra

Electronic spectra. Singlet-triplet states, fluorescence and phosphorescence.

Chemical Kinetics—Kinetics of reactions involving free radicals; Kinetics of polymerization and photochemical reactions.

Surface Chemistry and Catalysis—Physical adsorption and chemisorption, adsorption isotherms, surface area determination; heterogeneous catalysis, acid-base and enzyme catalysis.

Electrochemistry—Ionic equilibria, Theory of strong electrolytes; Debye-Huckel theory of activity coefficients, electrolytic conduction, galvanic cells, membrane equilibria and fuel cells. Electrolysis and overvoltage.

Thermodynamics—Laws of Thermodynamics and application to physicochemical processes, systems of variable compositions.

Transition Metal Chemistry—Electronic configuration, absorption spectra (including charge-transfer spectra), magnetic properties. Metal-metal bonds and metal atom clusters.

Electronic Structure of Transition Metal Complexes—Crystal field theory and modifications, complexes of π -acceptor ligands, organometallic compounds of transition metals.

Lanthanides and Actinides—Separation Chemistry, oxidation states, magnetic properties.

Reactions in non-aqueous solvents.

PAPER II

Physical Organic Chemistry :

Electronic displacements—inductive, electromeric, mesomeric and hyperconjugative effects. Electrophiles, nucleophiles and free radicals. Resonance and its applications to organic compounds. Effect of structure on the dissociation constants of organic acids and bases. Hydrogen bond and its effects on the properties of organic compounds.

Modern concepts of organic reaction mechanisms—addition, substitution, elimination and rearrangement. Reactions involving free radicals. Mechanisms of aromatic substitution. Benzyne intermediates.

Aliphatic Chemistry:

Chemistry of simple organic compounds belonging to the following classes—alkanes, alkenes, alkynes. Alkyl halides, alcohols, thiols, aldehydes, ketones, acids and their derivatives, ethers, amines. Amino acids, hydroxy acids, unsaturated acids, dibasic acids.

Synthetic uses of the following :—

Acetoacetic and malonic esters, organometallic compounds of magnesium and lithium, ketene, carbene and diazomethane.

Carbohydrates—classification, configuration and general reactions of simple monosaccharides. Chemistry of glucose, fructose and sucrose.

Stereochemistry:

Elements of symmetry and simple symmetry operations. Optical and geometrical isomerism in simple organic molecules. E, Z and R, S notations. Conformations of simple organic molecules. Stereochemistry of inorganic Co-ordination compounds.

Aromatic Chemistry:

Benzene, toluene and their halogeno, hydroxy, nitro and amino derivatives. Sulphonic acids. Zylenes. Benzaldehyde, Salicylaldehyde, acetophenone, Benzoic, phthalic, salicylic, cinnamic and mandelic acids Reduction products of nitrobenzene, Diazonium salts and their synthetic uses.

Structure, synthesis and important reactions of naphthalenes anthracene, phenanthrene, pyridine and quinoline.

Dyes belonging to the azo, triphenylmethane and phthalein groups Indigo and alizarin, phthalocyanines. Modern theories of colour and constitution.

General ideas regarding the Chemistry of nicotine, β -carotene. Vitamin C, quercetin, cholesterol, adamantane.

Basic concepts regarding the following materials of economic and medicinal importance—Cellulose and starch, coal tar chemicals, organic polymers, oils and fats, petrochemicals, Vitamins, hormones, alkaloids, fermentation products including antibiotics, Proteins.

Organic Photochemistry:

Energy level diagrams, quantum yield, Photochemistry of simple organic molecules.

*Polymers:**(a) Inorganic Polymers:*

Phospho-nitrilic polymers, silicones, metalchelate polymers. Phase Rule Studies.

(b) Physical Chemistry of Polymers:

Molecular weight averages, and group analysis. Sedimentation light scattering and viscosity of polymer solutions.

Alloys and intermetallic compounds.

Chemistry of the following elements and their principal compounds: Boron, Titanium, germanium, Tungsten, tantalum, Thorium, Uranium. Mechanism of substitution in Octahedral and planar inorganic complexes.

4. Commerce

PAPER I

*Part I**Basic techniques of Financial Analysis :*

Ratio Analysis, Fund Flow Analysis and short Term financial forecasting techniques: Analysis and Control of working capital—Analysis of capital expenditure and the technique of discounted cash flow—Cost of project, cost of capital and sources of financing: developing a framework of capitalisation structure in terms of debt/equity ratio, norms and guidelines used by financial institutions in India in providing finance; Reserve Bank of India and Govt. regulations affecting corporate finance, dividend policy—Important provisions of the Income Tax Act affecting business finance (Questions on specific sections of the Act will not be asked).

Part II

Role of financial institutions in providing finance to business and industry—Important provisions of the Negotiable Instruments Act and the Banking Regulation Act—Reserve Bank of India and its regulation of commercial banks—The structure of assets and liabilities of commercial banks—Liquidity and lending policy of the Reserve Bank of India. The structure of the Indian capital market—Term financing and specialised financial institutions—their role in development banking—the interest rate structure in the country and its regulation.

Loans and advances to customers—working capital financing—Secured and unsecured bank loans—Overdraft and cash credit facilities—The new bill market scheme and its operation—Concept of margin money—Regulation of 'Margins'—Concept of double financing, diversion of bank loans and preventive measures by commercial banks.

Nationalisation of commercial banking and the attainment of social objectives—credit to priority sectors—Export credit, credit to small industries, Credit to agriculture and credit to educated unemployed entrepreneurs—Evaluation of performance of nationalised commercial banks. Organisation of a commercial bank—Branch management—Different banking services—Cost of bank operations *vis-a-vis* profitability.

Alternative to Part II

Basic postulates of accounting theory and limitations of financial statements. Accounting for changes in Price levels. Advanced problems of company accounts including formulation of schemes of amalgamation and reconstruction and consolidation of accounts of holding and subsidiary companies.

Valuation of goodwill, shares and business. Valuation of inventory. Computation of taxable income from business. Accounting for human resources.

Test checks and audit on the basis of statistical sampling.

Liability and responsibility of auditors.

Propriety and Efficiency audit.

Cost Audit Special Audit Investigation.

Audit of Government Companies.

Difference between Government Audit and Commercial Audit.

PAPER II

Part I

Forms of Business Organisation—Corporate structure—Optimal size of unit—location of units—Considerations of Govt. control, diversification, vertical and horizontal integration. Product mix, pricing, corporate objectives and social responsibility of business units.

Organisation structure—basic principles—Authority and responsibility Delegation and levels of hierarchy—Span of supervision—Committee management, co-ordination and communication.

Manpower management—staffing, training and development—Personnel turnover—Systems of personnel remuneration. Human factor in management: Theories of motivation—morale, productivity, motivation—Job satisfaction and job enrichment—Role of leadership—Leadership styles—Participation of labour in management—Industrial relations in India—Public Enterprises in India—Forms of organisation—problem of accountability—pricing policy.

Part II

Concept of Management Control—areas of control; stores and inventory control; control of personnel turnover and absenteeism, control of administrative operations—financial control—concept of R.O.I. and its application in management control. Budgetary control; planning for budgetary control—profit planning—“cost-volume—profit” relationships—Break-even analysis—application of break-even concept in controlling operations.

Cost classification for profit planning and control—fixed and variable costs—techniques of separating costs into fixed and variable—developing standards for materials, labour and overheads—Standard costing and budgetary control—flexible Budgeting—variance analysis.

Classification of costs for purposes of decisions—engineered costs, capacity costs and managed costs—concept of “cost relevance” for managerial decisions—variable, marginal, opportunity, direct, controllable out of pocket and sunk costs—costing for pricing and control of products, marketing channels, territories, order size etc. Responsibility budgeting and management control. Productivity techniques for management control: Scientific management, work measurement, job evaluation; Internal audit—management audit.

5. Economics

PAPER I

1. The Framework of an Economy. National Income Accounting.
 2. Economic choice. Consumer behaviour. Producer behaviour and market forms.
 3. Investment decisions and determination of income and employment. Macro-economic models of income distribution and growth.
 4. Banking. Objectives and instruments of Central Banking and Credit policies in a planned developing economy.
 5. Types of taxes and their impacts on the economy. The impacts of the size and the content of budgets. Objectives and Instruments of budgetary and fiscal policy in a planned developing economy.
 6. International trade. Tariffs. The rate of exchange. The balance of payments.
- International monetary and banking institutions.

PAPER II

1. The Indian Economy:

Guiding principles of Indian economic policy—Planned growth and distributive justice—Eradication of poverty.

The institutional framework of the Indian economy—federal governmental structure—agricultural and industrial sectors—public and private sectors.

National income—its sectoral and regional distribution.

Extent and incidence of poverty.

2. Agricultural Production:

Agricultural policy.

Land reforms. Technological change. Relationship with the Industrial Sector.

3. Industrial Production:

Industrial policy.

Public and private sectors.

Regional distribution. Control of monopolies and monopolistic practices.

4. Pricing Policies for agricultural and industrial outputs.

Procurement and Public Distribution.

5. Budgetary trends and fiscal policy.

6. Monetary and credit trends and policy—Banking and other financial institutions.

7. Foreign trade and the balance of payments.

8. Indian Planning:

Objectives, strategy, experience and problems.

6(i). Civil Engineering

PAPER I

(A) *Theory and Design of Structures:*(a) *Theory*

Principle of superposition; reciprocal theorem; unsymmetrical bending.

Determinate and indeterminate structures; simple and space frames; degrees of freedom; virtual work; energy theorems; deflection of trusses; redundant frames; three-moment equation; slope deflection and moment distribution methods; column analogy; Energy methods; approximate and numerical methods.

Moving loads—Shearing force and Bending moment diagrams; influence lines for simple and continuous beams and frames.

Analysis of determinate and indeterminate arches; spandrel braced arch.

Matrix methods of analysis; stiffness and flexibility matrices.

Elements of plastic analysis.

(b) *Steel Design*

Factors of safety and load factor; Design of tension; compression and flexural members; built up beams and plate girders, semi-rigid and rigid connections.

Design of stanchions; slab and gusseted bases; crane and gantry girders; roof trusses; industrial and multi-storied buildings; water tanks.

Plastic design of continuous frames and portals.

103. R.C. Design

Design of slabs, simple and continuous beams, columns, footings—single and combined, raft foundations, elevated water tanks, encased beams and columns, ultimate load design.

Methods and systems of prestressing; anchorages; losses in prestress.

Design of prestressed girders, ultimate load design.

(B) Fluid Mechanics and Hydraulic Engineering:

Dynamics of fluid flow—Equations of continuity; energy and momentum; Bernoulli's theorem; cavitation; velocity potential and stream function; rotational and irrotational flow; free and forced vortices; flow net.

Dimensional analysis and its application to practical problems.

Viscous flow—Flow between static and moving parallel plates, flow through circular tubes; film lubrication; velocity distribution in laminar and turbulent flow; boundary layer.

Incompressible flow through pipes—Laminar and turbulent flow, critical velocity; losses, Stanton diagram. Hydraulic and energy grade lines; siphons; pipe network. Forces on pipe bends.

Compressible flow—Adiabatic and isentropic flow, subsonic and supersonic velocity; Mach number, shock waves; Water Hammer.

Open channel flow—Uniform and non-uniform flow, best hydraulic cross-section. Specific energy and critical depth gradually varied flow; classification of surface profiles; control sections; standing wave flume; Surges and waves. Hydraulic jump.

Design of canals—Unlined channels in alluvium; the critical tractive stress, principles of sediment transport, regime theories, lined channels; hydraulic design and cost analysis; drainage behind lining.

Canal structures—Designs of regulation works; cross drainage and communication works—cross regulators, head regulator, canal falls, aqueducts, metering flumes, etc. Canal outlets.

Diversion Headworks—Principles of design of different parts on impermeable and permeable foundations; Khosla's theory; Energy dissipation; sediment exclusion.

Dams—Design of rigid dams, earth dams; Forces acting on dams; stability analysis.

Design of spillways.

Wells and Tube Wells.

(C) *Soil Mechanics and Foundation Engineering :*

Soil Mechanics—Original Classification of soils; Atterburg limits; void ratio; moisture contents; permeability; laboratory and field tests. Seepage and flow nets, flow under hydraulic structures, uplift and quick sand condition. Unconfined and direct shear tests; triaxial test; earth pressure theories; stability of slopes; Theories of soil consolidation: rate of settlement. Total and effective stress analysis, pressure distribution in soils: Boussinesque and Westergaard theories. Soil stabilization.

Foundation Engineering—Bearing capacity of footings; piles and wells; design of retaining walls; sheet piles and caissons.

PAPER II

NOTE: A candidate shall answer questions only from any two parts and answer them in separate answer books.

Part A

Building Constructions

Building Materials and Constructions—timber, stone, brick, sand, surkhi, mortar, concrete, paints and varnishes, plastics, etc.

Detailing of walls, floors, roofs, ceilings, staircases, doors and windows. Finishing of buildings—plastering, pointing, painting, etc. Use of building codes. Ventilation, air conditioning, lighting and acoustics.

Building estimates and specifications. Construction scheduling—PERT and CPM methods.

Part B

Railways and Highways Engineering

(a) *Railways*—Permanent way, ballast; sleeper; chairs and fastenings; points, and crossing, different types of turn outs, cross-overs setting out of points.

Maintenance of track, super elevation; creep of rails; ruling gradients; track resistance, tractive effort; curve resistance.

Station yards and machinery; station buildings; platform sidings; turn tables.

Signals and interlocking; level crossings.

(b) *Roads and Runways*—Classification of roads, planning, geometric design.

Design of flexible and rigid pavements; sub-bases and wearing surfaces

Traffic engineering and traffic surveys; intersections; road signs; signals and markings.

Part C

Water Resources Engineering

Hydrology—Hydrologic cycle; precipitation; evaporation, transpiration and infiltration; hydrographs; unit hydrograph. Flood estimation and frequency.

Planning for Water Resources—Ground and surface water resources; surface flows. Single and multipurpose projects, storage capacity, reservoir losses, reservoir silting, flood routing. Benefit cost ratio. General principles of optimisation.

Water Requirements for crops—Quality of irrigation water, consumptive use of water, water depth and frequency of irrigation; duty of water; Irrigation methods and efficiencies.

Distribution system for canal irrigation—Determination of required channel capacity; channel losses. Alignment of main and distributory channels.

Waterlogging—Its causes and control, design of drainage system; soil salinity.

River training—Principles and Methods.

Storage Works—Types of dams (including earth dams), and their characteristics, principles of design, criteria for stability. Foundation treatment; joints and galleries. Control of seepage.

Spillways—Different types and their suitability; energy dissipation. Spillway crest gates.

Part D

Sanitation and Water Supply

Sanitation—Site and orientation of buildings; ventilation and damp proof course; house drainage; conservancy and water-borne systems of waste disposal. Sanitary appliances; latrines and urinals.

Disposal of sanitary sewage, industrial waste, storm sewage—Separate and combined systems. Flow through sewers; design of sewers, sewer appurtenances—manholes, inlets, junctions, syphon, ejection, etc.

Sewer treatment—Working principles; units; chambers; sedimentation tank, etc. Activated sludge process; septic tank; disposal of sludge.

Rural sanitation; Environment pollution and ecology.

Water Supply—Estimation of water resources; groundwater hydraulics; predicting demand of water. Impurities of water, physical, chemical and bacteriological analysis, water borne diseases.

Intake of water—Pumping and gravity schemes. Water treatment—Principles of settling, coagulation, flocculation and sedimentation. Slow, rapid and pressure filters; softening; removal of taste, odour and salinity.

Water Distribution—Layouts, storage; hydraulic pipelines; pipe fittings; pumping station and their operations.

6 (ii). Electrical Engineering

PAPER I

Network

Steady state analysis of d.c. and a.c. networks, network theorems, Matrix Algebra, network functions transient response, frequency response, Laplace transform, Fourier series and Fourier transform, frequency spectral polezero concept, elementary network synthesis.

Statics and magnetics

Analysis of electrostatic and magnetostatic fields; Laplace and Poisson Equations, solution of boundary value problems; Maxwell's equations, electromagnetic wave propagation, ground and space waves, propagation between earth station and satellites.

Measurements

Basic methods of measurements, standards, error analysis, indicating instruments, cathode ray oscilloscope; measurement of voltage, current, power, resistance, inductance, capacitance, time, frequency and flux; electronic meters.

Electronics

Vacuum and semiconductor devices; equivalent circuits, transistor parameters, determination of current and voltage gain and input and output impedances; biasing technique, single and multi-stage, audio and radio small signal and large signal amplifiers and their analysis; feedback amplifiers and oscillators; wave shaping circuits and time base generators; analysis of different types of multivibrator and their uses; digital circuits.

Electrical Machines

Generation of e, m, f, m, m, f, and torque in rotating machines; motor and generator characteristics of d.c. synchronous and induction machines; equivalent circuits; commutation; parallel operation; phasor diagrams and equivalent circuits of power transformer, determination of performance and efficiency, auto-transformers, 3-phase transformers.

PAPER II
SECTION A*Control Systems*

Mathematical modelling of dynamic linear control systems, block diagrams and signal flow graphs, transient response, steady state errors, stability, frequency response techniques, root-locus techniques, series compensation.

Industrial Electronics

Principles and design of single phase and polyphase rectifiers, controlled rectification, smoothing filters; regulated power supplies, speed control circuits for drives; inverters, d.c. to d.c. conversion, Choppers; timers and welding circuits.

SECTION B (Heavy currents)

Electrical Machines

Induction Machines:—Rotating magnetic field; Polyphase motor; principle of operation, phasor diagram; Torque slip characteristic; Equivalent circuit and determination of its parameters, circle diagram; starters; speed control; Double cage motor; Induction generator; Theory; Phasor diagram, characteristics and application of single phase motors, Application of two-phase induction motor.

Synchronous Machines:—e.m.f. equation; phasor and circle diagrams; operation on infinite bus; synchronizing power; operating characteristics and performance by different methods; sudden short circuit and analysis of oscillogram to determine machine reactances and time constants, motor characteristics and performance, methods of starting, Applications.

Special Machines:—Amplidyne and metadyne, operating characteristics and their applications.

Power Systems and Protection:—General layout and economics of different types of power stations; Baseload, peak-load and pumped-storage plants; Economics of different systems of d.c. and a.c. power distribution; Transmission line parameter calculation; concept of G.M.D. short, medium and long transmission line; Insulators, voltage distribution in a string of insulators and grading; Environmental effects on insulators. Fault calculation by symmetrical components; load flow analysis and economic operation; steady state and transient stability; Switch-gear, Methods of arc extinction; Re-striking and recovery voltage; Testing of circuit breaker; Protective relays; protective schemes for power system equipment; C.T. and P.T.; Surges in transmission lines; Travelling waves and protection.

Utilisation:—Industrial drives electric motors for various drives and estimation of their rating; Behaviour of motors during starting, acceleration, braking and reversing operations; Schemes of speed control for d.c. and induction motors.

Economics and other aspects of different systems of rail traction; Mechanics of train movement and estimation of power and energy requirements and motor ratings; characteristics of traction motors, Dielectric and induction heating.

OR

SECTION C (Light currents)

Communication Systems:—Generation and detection of amplitude—frequency—phase—and pulse-modulated signals using oscillators, modulators and demodulators, Comparison of modulated systems, noise problems, channel efficiency, sampling theorem, sound and vision broadcast transmitting and receiving systems, antennas, feeders and receiving circuits, transmission line at audio, radio and ultra high frequencies.

Microwaves:—Electromagnetic waves in guided media, wave guide components, cavity resonators, microwave tubes and solid-state devices, microwave generators and amplifiers, filters, microwave measuring techniques, microwave radiation pattern, communication and antenna systems, Radio aids to navigation.

D.C. Amplifiers:—Direct coupled amplifiers, difference amplifiers, choppers and analog computation.

PAPER I

Statics:—Equilibrium in three dimensions, suspension cables. Principle of virtual work.

Dynamics:—Relative motion, coriolis force. Motion of a rigid body. Gyroscopic motion. Impulse.

Theory of Machines:—Higher and lower pairs, inversions, steering mechanisms. Hooks joint, velocity and acceleration of links, inertia forces. Cams. Conjugate action in gearing and interference, gear trains, epicyclic gears. Clutches, belt drives, brakes, dynamometers, Flywheels Governors. Balancing of rotating and reciprocating masses and multicylinder engines. Free, forced and damped vibrations for a single degree of freedom. Degrees of freedom. Critical speed and whirling of shafts.

Mechanics of Solids:—Stress and strain in two dimensions. Mohr's circle. Theories of failure. Deflection of beams. Buckling of columns. Combined bending and torsion. Castigliano's theorem. Thick cylinders Rotating disks. Shrink fit. Thermal stresses.

Manufacturing Science:—Merchants' theory. Taylor's equation. Machinability. Unconventional machining methods including EDM, ECM and ultrasonic machining. Use of lasers and plasmas. Analysis of forming processes. High velocity forming. Explosive forming. Surface roughness, gauging, comparators. Jigs and Fixtures.

Production Management:—Work simplification, work sampling, value engineering. Line balancing, work station design, storage space requirement. ABC analysis. Economic order quantity including finite production rate. Graphical and simplex methods for linear programming; transportation model, elementary queuing theory. Quality control and its uses in product design. Use of \bar{X} , R , P , σ and C charts. Single sampling plans, operating characteristics curves. Average sample size. Regression analysis.

PAPER II

Thermodynamics:—Applications of the first and second laws of thermodynamics. Detailed analysis of thermodynamic cycles.

Fluid Mechanics:—Continuity, momentum and energy equations. Velocity distribution in laminar and turbulent flow. Dimensional analysis. Boundary layer on a flat plate. Adiabatic and isentropic flow, Mach number.

Heat Transfer:—Critical thickness of insulation. Conduction in the presence of heat sources and sinks. Heat transfer from fins. One dimensional unsteady conduction. Time constant for thermocouples. Momentum and energy equations for boundary layers on a flat plate. Dimensionless numbers. Free and Forced convection. Boiling and condensation. Nature of radiant heat. Stefan-Boltzmann law. Configuration factor. Logarithmic mean temperature difference. Heat exchanger effectiveness and number of transfer units.

Energy Conversion: Combustion phenomenon in C.I. and S.I. engines. Carburation and fuel injection. Selection of pumps. Classification of hydraulic turbines, specific speed. Performance of compressors. Analysis of steam and gas turbines. High pressure boilers. Unconventional power systems, including Nuclear power and MHD systems. Utilisation of solar energy.

Environmental control:—Vapour compression, absorption, steam jet and air refrigeration systems. Properties and characteristics of important refrigerants. Use of psychrometric chart and comfort chart. Estimation of cooling and heating loads. Calculation of supply air state and rate. Air-conditioning plant layout.

7. Geography

PAPER I

Section A

Geomorphology

Interior of the earth—history, origin of the continents and ocean basins.

Earth movements—Geosynclines—mountain building.

Rocks and weathering; Evolution of land forms—fluvial, glacial, arid, marine and karst.

Climatology

Composition and structure of the atmosphere. Insolation and heat budget of the atmosphere.

Humidity and precipitation—Air Masses—Fronts and Frontal Analysis—Classification of World climates.

Oceanography

Distribution of water bodies over the globe—Physical configuration of the oceanfloor—Distribution of temperature and salinity—Ocean deposits—Movement of ocean waters.

Human Geography

Scope of Human Geography, Environmentalism, Determinism and Possibilism. Characteristics of Cultural landscape of the following types of productive occupations—Pastoralism, hunting, fishing and manufacturing.

Political Geography

The nature and scope of Political Geography; Schools in Political Geography; State and Nations; Frontier and Boundaries—Evolution of World Political patterns.

*Section B***History of Geographical Thoughts and Discoveries.**

The extent of geographical knowledge in the classical period; Contribution of Arab Geographers—The Great Age of Discoveries—Contributions of Geographers in the 17th and 19th Centuries and contributions of modern Geographers.

Industrial Geography

Scope of Industrial Geography. Theories of Industrial Location—A study of the development and location of the following industries.

Iron and Steel, cotton textile, Jute, chemical study of regional characteristics of industrial complexes.

Historical Geography of India

Nature and scope of Historical Geography, physical landscape, political and administrative boundaries and patterns of economic and social geography of India during the seventh and thirteenth centuries—Aspects of India's Geography as reconstructed from foreign travellers.

Anthropogeography

Scope of anthropogeography. Environment and antiquity of man. A study of the cultural and social development in India from the palaeolithic times. A study of some important tribes of India—Todas—Gonds; Bihor—Santhals—Nagas.

Agricultural Geography

The origin and development of agriculture—factors influencing agriculture—Types of Farming—concepts and methodology of delimiting Agricultural regions—crop combination regions—Agricultural efficiency, agricultural productivity; Land use and Nutrition.

PAPER II*Section A**Economic Geography*

Scope of Economic Geography—Influence of environment on productive occupations—extractive—agricultural and manufacturing—Location—Location of the primary, secondary and tertiary activities—Regional Survey and Planning.

Urban Geography

Scope and Function of Urban Geography—Origin and growth of cities—Pattern of urbanisation—Classification of towns—Urban field—theories of location of cities—Morphology of cities—Rural-urban Fringe.

Population Geography

Theories of population distribution and growth—Demographic Characteristics—Age-Sex composition, working population—Demographic mobility—International and National : Population patterns and levels of development in different parts of the world.

Quantitative Geography. Central tendency and Disperation—Centographic and Nearest Neighbour Analysis—Correlation and Regression—Testing of Geographical hypothesis.

Cartography—Map Projections—Principles and nature of map projections—Properties and mode of construction and uses of the following projections : Azimuthal projections (polar cases); simple conical projections, with two standard parallels, Bonnes and Polyconic, Cylindrical and Mercator Projections, Sinusoidal Projection, Mallweide's Projection. Choice of Map Projection.

Methods of representation of relief profiles; Representation of economic, climatic and population data.

*Section B**Physical, Economic and Regional Geography of India*

- (i) Structure, relief, climate and soils;
- (ii) Population and its problems;
- (iii) Agriculture, agrarian problems and programmes;
- (iv) Irrigation and River Valley Projects;
- (v) Power and Mineral Resources;
- (vi) Industries and industrial development of India under the Plans, Regions of India, Basis of the Division. A study of the regional divisions.

8. Geology**PAPER I**

GENERAL GEOLOGY, GEOMORPHOLOGY, STRUCTURAL GEOLOGY, STRATIGRAPHY AND PALAEOONTOLOGY

1. *General Geology*.—Origin of the Earth. Continents & Ocean—their distribution, evolution and origin. Continental drift, ocean spreading and plate tectonics.

Palaeoclimates and their significance. Isostasy. Palaeomagnetism. Radioactivity and its application to Geology. Geochronology and age of the Earth. Seismology. Interior of the Earth. Geosynclines and their classification. Volcanology. Island arcs, deep-sea trenches and mid-ocean ridges.

2. *Geomorphology*.—Basic concepts and significance. Agents of geomorphic processes and parameters. Geomorphic cycles and their interpretations. Geomorphic features of the Indian subcontinent. Topography and its relation to structures.

3. *Structural Geology*.—Diasrophism. Rock deformation. Origin of mountains. Mechanics of folding and faulting. Petrofabric analysis and its graphic representation.

4. *Stratigraphy*.—Principles of stratigraphy and nomenclature. Outlines of world stratigraphy and palaeogeography. Detailed study of Indian Stratigraphy. Correlation of the major Indian formations with their world equivalents.

Palaeontology :

Evolution : Fossils, their modes of preservation and uses.

- (a) Morphology, classification and geological history of invertebrates, with detailed knowledge of corals, brachiopodes lamellibranchs, ammonites gastropods, trilobites, echinoderms, graptolites.
- (b) *Vertebrates*.—Principal groups of vertebrates—fishes, reptiles and mammals. Detailed study of man, elephant and horse.
- (c) *Plants*.—Gondwana flora and its importance.
- (d) *Micropalaeontology*.—Its study and importance with special reference to oil exploration.

PAPER II

CRYSTALLOGRAPHY, MINERALOGY, PETROLOGY AND ECONOMIC GEOLOGY

Crystallography.—Crystal systems and classifications. Atomic structure. Derivation of classes. Twinning. Optic anomalies.

Mineralogy.—Detailed study of rock forming minerals—their physical, chemical and optical properties. Silicate structures and types.

Optical Mineralogy.—Optics. Description and application of optical indicatrices. Interference figures. Optic axial angle and dispersion.

Petrology.—Origin, evolution and classification of igneous rocks. Reaction principle. Study of important binary and ternary systems. Igneous textures and structures and their significance. Petrochemistry. Petrography and Petrogeneosis of important rock types (granites, pegmatites, basalts, anorthosites and ultramafics).

Classification of sedimentary rocks, clastic and non-clastic. Sedimentary environments. Provenance. Sedimentary structures and textures.

Classification of metamorphic rocks. Types and controls of metamorphism. Metamorphic zones and facies. Metasomatism, and granulization. Petrography and petrogenesis of important rock types e.g. charnockites, gneisses etc.

Economic Geology.—Processes of mineral formation. Classification of ore deposits. Control of ore localization. Study of the metallic and non-metallic mineral deposits of India. Mineral wealth of India. Mineral economics. National Mineral policy. Conservation and utilisation of minerals.

Applied Geology.—Prospecting and exploration techniques. Principal methods of mining, sampling, ore-dressing and beneficiation. Application of geology to common engineering problems.

Soil and groundwater geology. Elements of geochemistry and geophysics. Photogeology.

9. History

PAPER I—INDIAN HISTORY

Section A—Ancient India

1. *The Indus Civilization*

The cultures which played a role in the evolution of the cities.

The major cities and their characteristic features. Trade and contacts within the sub-continent and outside. Causes of the decline of the cities. Survival and continuity of the Indus civilisation.

2. *The Vedic Age*

Geographical area known to Vedic texts. Differences and similarities between Vedic culture and Indus civilisation. Social and political patterns of the Vedic age. Major religious ideas and rituals of the Vedic age.

3. *The Ganges Valley.*—The second urbanisation. The Janapads of the Ganges valley and the growth of towns. Social and economic patterns. The social background to Buddhism and the heterodox sects.

4. *The Mauryan Empire*

Mauryan chronology and sources.

Administration of the empire.

Social and economic activity.

Asoka's policy of Dhamma.

5. *Political and Economic History of India, c. 200 B.C. to A.D. 300*

The emergence of kingdoms in northern and southern India : their geographical and political basis.

The contribution of trade to the development of Indian economy and society.

Indian contacts with central Asia, west Asia and south-east Asia.

The Development of Buddhism and the emergence of Bhagvatism.

6. *The Gupta period*

Political history of the Gupta kings.

Agrarian structure and revenue system.

Development of arts, literature, etc.

Development of Vaishnavism, Saivism, etc.

7. *India in the Seventh century A.D.*

Harshavardhana.

The Chalukyas.

The Pallaves.

OR

Section B—Medieval India

Northern India, 650—1200. Political and social conditions. The Feudal economy. The Chola Empire; the South Indian village system. Sankaracharya.

The Turkish conquests and the Delhi Saltanate (1206—1526). The land-revenue system and military and administrative organisation. Changes in economy and society. Evolution of Indo-Persian culture; literature and art.

The Provincial Kingdoms. Polity and Society of the Vijayanagara Empire.

Religious movements of the 15th and 16th centuries. The new literary languages (Bengali, Hindi dialects, Panjabi, Marathi, etc.)

The contest for Northern India, 1526—56. The Sur administration.

The Mughal Empire, 1556—1707. Political history. The *mansab* and *jagir* systems. Central and provincial administration. Land revenue. Religious policy.

Indian economy, 16th and 17th centuries. Agriculture and agrarian classes. Towns and commerce. The opening and development of European trade.

Mughal court culture : Literature, painting and architecture. Religious trends.

The 18th century. Disintegration of the Mughal Empire; its successions states (Deccan, Bengal, Awadh). The Marathas : From Shivaji to 1803.

Section C—Modern India

(1757—1947)

British Conquest of Bengal; Changing Patterns of British Colonialism; Economic Impact of British Rule; Changes in Agrarian Structure; the Permanent Settlement; the Ryotwari; Commercialization of Agriculture; Rural Indebtedness; Growth of Agricultural Labour; Destruction of Handicraft Industries; Growth of Modern Industry and the Capitalist Class; Growth of Foreign Capital; Foreign Trade; Tariff Policy; the Role of the State in Indian Economy; the Drain Wealth; Revolt of 1857; Peasant Movements in Bengal and Maharashtra; Changes in British Administrative and Economic Policies after 1858; Social Basis of Indian National Movement; Programme, Policies, Ideology and Techniques of Political work of the Early Nationalists; Official Response to early National Movement from Dufferin to Curzon; Religious Reform Movements; Social Reform and Lower Caste Movements and Social Change; The Anti-Partition of Bengal Agitation and Swadeshi Movement; Programme, Policies, Ideology and Techniques of Political work of the Militant Nationalists; Emergence of Revolutionary Terrorism; Rise of Communalism; Rise and Growth of Regional and Caste Movements in South India and Maharashtra; Emergence of Gandhi in Indian Politics; the First Non-Cooperation Movement; the Swarajist; Boycott of Simon Commission and the Nehru Report; Purna Swaraj and the Second Civil Disobedience Movement; Growth of Industrial Working Class and the Trade Union Movement; Peasant Movement 1919—50; the Rise and Growth of Left-Wing within the Congress, the Congress Socialists and the Communists; the Revolutionary Terrorist; the State Peoples Movements; Development of Nationalist Foreign Policy; Development of Nationalist Planning Ideology; The Congress and other Ministries after 1936; Growth and Spread of Communalism; India during the World War II; The Cripps Mission; the Revolt of 1942; The Indian National Army; Post-War Mass Movements; Achievement of Freedom and the Partition of India; Integration of Indian States.

PAPER II—WORLD HISTORY

Section A—Ancient World

1. *Historical change in society on the basis of archaeological evidence*, with special emphasis on the transition from food-gathering to food-producing. A brief survey of the main characteristics of Palaeolithic, Neolithic, Chalcolithic and Megalithic Societies with particular reference to the manner in which changing cultures can be recognised.

2. *Bronze age civilizations*

Sumer.

Egypt.

Shang Civilisation of China.

Maya Civilization of central America.

3. *Greek civilization*

Political systems.

Social and economic structure.

Science and technological change.

Visual arts and literature.

4. *Rome—Republic and Empire*

The political system.

The agrarian structure of republic and empire.

The role of religion in the Roman empire.

The Decline of the Roman empire.

5. *The Achaemenid Empire*

The Political system.

Society and economy.

The role of religion.

Causes of decline.

6. *The Ch'in and Han empires of China*

Political system.

Social structure and economy.

The civil service.

OR

Section B—Medieval World

Feudal Europe. The monorial system in Western and Central Europe. The Holy Roman Empire. The Roman Catholic Church. The Renaissance and Reformation : Social and intellectual aspects. Emergence of the Nation States, 16th century.

The Islamic World. Rise of Islam. The Arab Empire (Early Caliphate, Umayyids and Abbasids). Culture and Science. Organisation of state and society.

China, from the Sui to the Manchus. Land-control and the imperial system. Basic elements of Chinese culture. Togukawa Japan : Social, economic and political structure.

OR

Section C—Modern World

A. (i) Age of Mercantilism and beginnings of Capitalism.

(ii) Agricultural Revolution in Western Europe, 16th to 18th century.

(iii) Technological Revolution leading to Factory industries.

(iv) Development of Capitalism in Britain, France, Germany and Japan.

(v) Development of Imperialism in the 19th century, and theories of Imperialism.

- (i) Aims, Achievements and Character of the French Revolution, 1789—1795.
 - (ii) Roots of Nationalism in 19th century Italy and Germany.
 - (iii) Rise of Liberalism in Britain in the 19th century.
 - (iv) The Russian Revolution of 1917.
 - (v) Nazism in Germany; Nationalism and Militarism in Japan, 1928—1941.
- C. (i) Stages of Colonialism in India, Mercantilist, Free Trade and Finance Capital.
- (ii) Dutch Colonialism in Indonesia in the 19th century.
 - (iii) Egypt under Mohammed Ali, Said Pasha and Ismail Pasha—Colonization of Egyptian Economy, 1876—1920.
 - (iv) The Opium War and the Development of the Treaty Port System in China, 1840—1860, Finance Capital in China 1895—1914.
 - (v) The Anti-Imperialist Movements in China, Indonesia, Indo-China and Egypt.... The Revolution in China, 1919—1949.

10. International Relations

PAPER I

1. Approaches to the study of international relations : classical and scientific (including systems, communication and decision making).
2. The role of ideology in international relations.
3. Power : foundations, components and limitations.
4. National interest : the role in the formulation of foreign policy.
5. The theories of balance of power.
6. Non-alignment : content and relevance.
7. The role of international law in international relations.
8. Diplomacy : traditional schools and contemporary trends.
9. Quest for a new international economic order.
10. De-colonization and neo-colonialism.
11. Arms race, disarmament and arms control.
12. International intervention : ideological, political and economic.

PAPER II

(At least two questions from each section)

Section A

1. The Nuclear Age and its Impact on International Relations.
2. The Cold War : Origins, Evolution and Implications.
3. Detente (US-Soviet and Sino-American) : Foundations and Consequences.
4. Asian-African Resurgence in International Relations.
5. The United Nations at Work.
6. European Integration : EEC and other Manifestations.
7. Politics of the Indian Ocean Area.
8. The Sino-Soviet Rift : Causes and Consequences.
9. The West Asian Conflict : Underlying Factors and the Role of Outside Powers.
10. The Conflict in Indo-China : Origins, Involvement of Outside Powers and Lessons of the Conflict.
11. Conflict and Cooperation in South Asia.
12. International Trade and Aid as Factors in World Politics.

Section B

13. Fundamentals of India's Foreign Policy and Relations.
14. The Foreign Policies (Post Second World War) of the USA, the USSR, Pakistan and China.

Note.—A question on India's Foreign Policy must be made compulsory for all examinees.

II. Law

PAPER I

1. *Constitutional and Administrative Law :*

- (a) Constitutional Law : Preamble; Directive Principles; Fundamental Rights; Judiciary; Centre and State Relations; Distribution of Legislative Powers; President and his Powers; Provision to Civil Servants; Amendment of the Constitution.
- (b) Administrative Law : Nature and Growth; Principles of Natural Justice; Judicial Review; Administrative Agencies and Tribunals; Delegated Legislation; Ombudsman.

2. *International Law :*

Nature and sources of International Law; History of International Law; Schools of International Law; International Law and Municipal Law.

States as persons of International Law : Acquisition and Loss of International Personality; State recognition; Modes of acquisition of Territory, Law of sea.

Rights and Duties of the States

Treaties.

Individual and international Law; Aliens; Nationality; Naturalisation; Statelessness.

Extradition. Asylum and Human Rights.

War : Declaration; Effects; Self-defence; Collective Security; Regional Pacts.

Outlawry of war; Belligerency and insurgency; Law of Belligerent Occupation; Prisoners of war; War criminals.

Blockade and contraband; Right of visit and search; Prize Courts.

Neutrality and neutralisation.

Rights and duties of Neutral States in war.

Unneutral services; Neutrality under U.N. Charter.

Charter of the United Nations and its principal organs.

PAPER II

Mercantile Law :

General principles of Law of Contract (Section 1 to 75) of the Indian Contract Act, 1872.

Law of Indemnity; Guarantee; Bailment; Pledge and Agency.

Law of Sale of Goods. Law of Partnership and Negotiable Instruments and Banking. (General Principles) with special reference to Indian Law.

Company Law.

Law of Torts and Crimes :

Torts : Nature. General Exceptions; Tort of negligence, nuisance, trespass to person and property.

Defamation, vicarious liability, strict liability and state liability.

Crimes : General exceptions from criminal liability (Sections 76 to 106).

Conspiracy (Section 34); Sedition (Section 120).

Offences against public tranquility (Sections 141, 142, 146, 149 and 159).

Offences affecting human body. (Sections 299, 300, 301, 319, 320, 322, 340, 359, 360, 361, 362).

Offences against property. (Sections 378, 383, 390, 391, 399, 403, 405, 415, 420, 441).

Attempts. (Section 511).

12. Literature of the following languages

12. (i) ARABIC

PAPER I

1. (a) Origin and development of the language (in outline).
(b) Significant features of the grammar of the language. Rhetorics, Prosody.
2. Literary History & Literary criticism—Literary movements, classical background; Socio-Cultural influences and modern trends; Origin and development of modern literary genres including drama, novel, short story, essay.
3. Short Essay in Arabic.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

POETS :

1. Imarul Qais : His Maullaqah:—
"Qifaa Nabki mim Zikraa Habibin Wa Manzili" (Complete)
2. Zohair Bin Abi Sulma : His Maullaqah :—
"A Min Aufaa dimnatun lam takalemi" (Complete)
3. Hassan Bin Thabit : The following five Qasaid from his Diwan : From Qasidah No. I to Qasidah No. IV and the Qasidah:—
"Lilahi Darru isaabatin Nadamtuhum + Yauman bijillaa".
4. Umar Bin Abi Rabiah : 5 Ghazals from his Diwan:—
 - (i) Falamma towaqafna wa sallamtu oshraqat + Wujuhum Zahaha. Husnu an tataqanaa. (Complete).
 - (ii) Laita Hindan anjazatna ma taidu + Wa shafat' anfusona mimma tajidu. (Complete).
 - (iii) Katabtu ilaiki min baladi + Kitaba muwallahin Kamadi. (Complete).
 - (iv) Amin aali Numin anta ghaadin famubkuru + ghadata ghadin am raaihun famuhajjaru. (Complete).
 - (v) Qaalali feeha Ateequn maqaalan + Fajarat mimma Yaqooluddumocu. (Complete).

Farazdaq : The following 4 Qasaid from his Diwan :

- (i) "Haazal lazi taariful Bathaau watatahu" in praise of Zainul Abideen Ali Bin Husain.
- (ii) "Zaarat Sakeenatu atlaahan anakha bihim" in praise of Umar Bin A. Aziz.
- (iii) "Wa Koomin tanamul adhyaf ainan" in praise of Saeed Bin Al-aas. (Complete).
- (iv) "Wa atlasa assaalinwa maa Kana sahiban" in praise of "the Wolf".

6. Bashhar Bin Murd : The following two Qasaid from his Diwan :

- (i) "Izaa balaghar raaiul mashwarata festain + Biraai naseehin aw naseehate haazini. (Complete)
- (ii) Khalilaiya min Kaabin aenaa akhookumaa + Alaa dahrahi innal Kareem muinu. (Complete)

7. Abu Nawas : First three Qasaid from his Diwan.

8. Shauqi : The following five Qasaid from his Diwan "Al-Shauqiya".

- (i) "Ghaaba Boloum" (Complete)
- (ii) "Kaneesatun saarat ilaa masjid" (Complete)
- (iii) "Ashloo hawaki liman yaloomu fayaaazaru" (Complete)
- (iv) "Salgamun min sabaa Baradaa araqqu" (Nakbatu Dimashk). (Complete)
- (v) "Salaamun Neel yaa Ghandi + Wa hazaz Zahru min indi". (Complete).

Authors :

1. Ibnul Muqaff : *Kalila Wa Dimna* excluding Muqaddamah:—
Chapter : I complete "Al-Asad wa-al thaus".
2. Al-Jahiz : *Al-Bayan Wat Tab'* in : V-II Edited by Abdul Salam Mohd. Haroon, Cairo, Egypt from pp. 31 to 85.
3. Ibn Khaldun : his Muqaddamah : 39 pages : part six from the first chapter :
From : "Al faslul saadis minal kitaabil awwal"—to : "Wa min Furooihi al Jabruwal muqabla".
4. Mahmud Timur : Story : "Ammi Mutawalli" from his book "Qaalar Raawi".
5. Taufiq Al-Hakim : Drama : *Sirrul muntahiraa* from his book "Masrahiyaatu Taufiqal Hakim".

NOTE.—Candidates will be required to answer some questions carrying not less than 25 % marks in Arabic also.

12. (ii) Assamese

PAPER I

Part I : Language

- (a) History of the origin and development of the Assamese language—its position among Indo-Aryan languages—periods in its history.
- (b) Morphology of the language—prefixes and suffixes—post-positions—declension and conjugation. The sound system in the language with reference to Old Indo-Aryan.
- (c) Dialectal divergences—the Standard Colloquial and the Kamrupi dialect in particular.

Part II : Literary History and Literary Criticism

Principles of literary criticism—different literary forms—development of these forms in Assamese.

Periods in the literary history from the earliest beginnings to modern times with their socio-cultural background. The proto-Assamese poetry—the Charyagits. Pre-Sankaradeva poetry. The Vaishnava renaissance and the effect of the Sankaradeva movement upon Assamese life and letters. The beginning of prose—a poetical variety in drama and in renderings of the *Bhagavata*—*Purana* and *Bhagavadgita*, and a realistic variety in chronicles called *buranji*. The post-Sankaradeva decadence in literature. The coming of the British rulers and American missionaries. The new forms of poetry, drama, fiction, biography, essay and criticism.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

Madhava Kandali	: <i>Ramayana</i>
Sankaradeva :	: <i>Rukmini-harana</i> (<i>Kavya and Nataka</i>)
Madhavadeva	: <i>Bargit, Arjuna-Bhanjana-nataka</i>
Vaikumthanath Bhattacharya	: <i>Gita-Katha. Bhagavata-Katha</i> Books I-II.
Lakshminath Bizbaroa	: <i>Srisankuradeva aru Srimadhavadeva, Mor Jivan-Sowaran</i>
Pádmánath Gohain	: Barua : <i>Gaobura, Srikrishna</i>
Rajanikanta Bardalai	: <i>Mirijiyari. Manomati</i>
Banikamta Kakati	: <i>Purani Asamiya Sahitya. Sahitya aru Prem</i>
Suryyakumar Bhuyan	: <i>Anandaram Baruwa. Vidrohar Buranji</i>
Birinchi Kumar Burma	: <i>Jivanar Batat. Seuji Patar Kahini</i>

12. (iii) Bengali

PAPER I

1. *History of the Bengali Language*

(i) Origin and development of the language

(ii) Major dialects of Bengali

(iii) *Sadhu bhasa* and *Chalita Bhasa*

(iv) Problems of standardization and reform with special reference to spelling system, alphabet and transliteration (Romanization).

2. *History of Bengali Literature*

Students are expected to be acquainted with

(i) the history of the Bengali Literature from the earliest period to the modern times

(ii) social and cultural background of Bengali literature

(iii) Sanskritic background of Bengali Literature

(iv) Western influence on Bengali literature

(v) Modern trends.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

1. *Vaishnava Padavali*2. Mukundaram : *Chandimangal*3. Michael Madhusudan Datta : *Meghanadvadh Kavya*4. Bankim Chandra Chattopadhyay : *Krishna Kanter Uil Kamala Kanter Daptar*5. Rabindranath Tagore : *Galpaguccha (I) Chitra Punascha Rakta Karabi*6. Sarat Chandra Chattopadhyay : *Srikanta (I)*7. Pramatha Chauduri : *Prabandha Samgraha (I)*8. Bibhuti Bhushan Bandyopadhyay : *Pather Panchali*9. Tarashankar Bandyopadhyay : *Ganadevata*10. Jibanananda Das : *Banalata Sen*

PAPER I

Detailed study of a literary age (19th century).

The paper will cover the study of English literature from 1798 to 1900 with special reference to the works of Wordsworth, Coleridge, Shelley, Keats, Lamb, Hazlitt, Thackeray, Dickens, Tennyson, Robert Browning, Arnold, George Eliot, Carlyle, Ruskin, Pater.

Evidence of first-hand reading will be required. The paper will be designed to test not only the candidates' knowledge of the authors prescribed but also their understanding of the main literary trends during the period. Questions having a bearing on the social and cultural background of the period may be included.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

- | | |
|--------------------------|---|
| 1. Shakespeare | : As You Like It; Henry IV—Parts I & II; Hamlet; The Tempest. |
| 2. Milton | : Paradise Lost |
| 3. Jane Austen | : Emma |
| 4. Wordsworth | : The Prelude |
| 5. Dickens | : David Copperfield |
| 6. George Eliot | : Middlemarch |
| 7. Hardy | : Jude the Obscure |
| 8. Yeats : | : Easter 1916 |
| The Second Coming | Byzantium |
| A Prayer for My Daughter | Leda and the Swan |
| Sailing to Byzantium | Meru |
| The Tower | Lapis Lazuli |
| Among School Children | |
| 9. Eliot | : The Waste Land |
| 10. D. H. Lawrence | : The Rainbow |

PAPER I

Part I

- (a) Essay in French on a topical subject (30 marks)
 (b) Precis of a given passage (20 marks)

Part II

Main trends in French literature

- (a) Classicism
 (b) The Romantic Movement
 (c) Evolution of the Novel in the 19th and 20th centuries (Upto 1940).
 (d) New dimensions in French Poetry in the second half of the 19th century. (From Baudelaire onwards)
 (e) History and literary criticism as new literary forms in the 19th century.

Candidates are expected to have a good knowledge of the Socio-historical background of the period.

NOTE.—There will be two questions in Part II, one of which must be answered in French and one may be answered in English.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

- | | |
|------------------|--|
| 1. Rabelais | : Le Tiers Livre |
| 2. Corneille | : (a) Le Cid
(b) Polyeucte |
| 3. Racine | : (a) Phedre
(b) Andromaque |
| 4. Moliere | : (a) Le Tartuffe
(b) L' Avare |
| 5. Voltaire | : (a) Candide
(b) Zadig |
| 6. Rousseau | : Le Contrat Social |
| 7. Victor Hugo | : (a) Les Contemplations
(b) Les Chatiments |
| 8. Saint Exupery | : Vol de Nuit |
| 9. Malraux | : La Condition Humaine |
| 10. Apollinaire | : Alcools |

NOTE.—Questions from this paper should be answered in French.

12(vi) German

PAPER I

Part A

1. Essay to be written in German. (30 marks)
2. Translation from English into German. (20 marks)

Part B

The paper will cover the study of German Literature from 1800 to 1955 with special reference to the representative authors of the most important epochs during this period. This paper should expose their critical understanding of these literary events and their social relevance.

The candidates will have to have the knowledge of the following literary epochs and their respective writers :

1. Classical Age : Goethe, Schiller.
2. Romantic Age with special reference to Heine.
3. The Poetical Realism : the works of Keller, Fontane, C. F. Meyer.
4. Naturalism : Hauptmann
5. Literature after 1945 : Boll, Brecht.

NOTE.—Two questions will have to be answered out of which one must be in German.

PAPER II

The candidate is expected to have a first-hand knowledge of the original text and should be in a position to interpret the representative works of the German authors. The candidate must have read the following texts in German :

1. Poems : by the representative poets of the Romantic period : Eichendorf, Heine Brentano and Unland and Goethe's poems from Sturm-und-Drang period.
2. Novellettes :
 - (a) Droste-Hulshoff : Judenbuche
 - (b) Raabe : Die Chronik der Sperlingsgasse
 - (c) Storm : Immensee or Pole Poppenspalter
 - (d) Mann : Tonio Kroger.
3. A Play by Bertolt Brecht : Leben des Galielei
4. Short stories by Heinrich Boll, Thomas Mann. (Vertauschte Kopfe).

NOTE.—Questions from this paper should be answered in German.

PAPER I

Part I

- (a) History of Gujarati Language with special reference to New Indo-Aryan *i.e.* last one thousand years.
- (b) Significant features of the grammar of the language.
- (c) Major dialects/varieties of the language.

Part II

- (a) Literary History-Pre-Narsingh and Post-Narsingh Literature, Pandit Yug, Gandhi Yug and Post-Independence period.
- (b) Literary Criticism : Development of Gujarati Criticism—Critical tradition from Navalram onwards, highlighting the major movements, Controversies and critical methods. An acquaintance with modernistic trends and movements in Gujarati Literature.
- (c) Salient features, History and Development of the following Literary forms :
 1. Akhyana and the Narrative poetry.
 2. The Lyrical poetry.
 3. Bhavai, Drama and one-Act plays.
 4. Novel and short story.
 5. Biography, Autobiography, Diaries and Letters.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

1. Premanand :

1. Nalekhyan Ed. by Maganbhai Desai, Navjivan Prakashan Mandir., Ahmedabad 14 or any other Edition,
2. Kunvarbainun Mameu Ruri Ed. by Maganbhai Desai. Navjivan Prakashan Mandir, Ahmedabad 14 or any other Edition.

2. Shamal :

1. Madan Mohna Ed. by Dr. H. C. Bhayani or any other Edition.

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|----------------------------|--|
| 3. Narmad : | 1. Narmadhu Padya Mandir. Ed. by V. M. Bhanu. |
| 4. Goverdhanram Tripathi : | 1. Sarasvatichandra Vol. I & II. |
| 5. K. M. Munshi | 1. Gujarat No Nath Pub. Gurjar, Granth Ratna Karyalaya, Ahmedabad. |
| | 2. Kaka-Nishashi—Pub. As above. |
| 6. Nanlal : | 1. Indukumar Vol. I. |
| | 2. Vishvageeta. |
| 7. Kant : | 1. Purvalap |
| 8. Gandhiji : | 1. Atmakatha |
| | 2. Mangal Prabhat |
| 9. Ramnarayan Pathak : | 1. Dvirephnivato, Vol. I. |
| | 2. Arvachin Kavya Sahityanan Vaheno. |
| 10. Umashankar Joshi : | 1. Mahaprasthan Pub., Vora and Co., Ahmedabad. |
| | 2. Gosthi Pub. Gurjar, Granth Ratna Karyalaya, Ahmedabad. |

12.(viii) **Hindi****PAPER I****1. History of Hindi Language**

- (i) Grammatical and Lexical features of Apabhraṃsa, Avahatta and early Hindi.
- (ii) Evolution of Avadhi and Braj Bhasa as literary Language during the Medieval period.
- (iii) Evolution of Khari Boli Hindi as literary Language during the 19th century.
- (iv) Standardization of Hindi Language with Devanagari Script.
- (v) Development of Hindi as Rastra Bhasa during the Freedom Struggle.
- (vi) Development of Hindi as official language of Indian Union since Independence.
- (vii) Major Dialects of Hindi and their interrelationship.
- (viii) Significant grammatical features of standard Hindi.

History of Hindi Literature

- (i) Chief characteristics of the major periods of Hindi literature: viz. Adi Kal, Bhakti Kal, Riti Kal, Bhartendu Kal and Dwivedi Kal etc.
- (ii) Significant features of the main literary trends and tendencies in Modern Hindi: viz.—Chhayavad, Rahasyavad, Pragativad, Prayogvad, Nayi Kavita, Nayi Kahani, Akavita etc.
- (iii) Rise of Novel and Realism in Modern Hindi.
- (iv) A brief History of theatre and drama in Hindi.
- (v) Theories of literary criticism in Hindi and Major Hindi literary critics.
- (vi) Origin and development of literary genres in Hindi.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

KABIR:	KABIR GRANTHAVALI (200 Stanzas from the beginning).
SURDAS:	BHRAMARA GEET SAAR. (200 Stanzas from the beginning only).
TULSIDAS:	FROM RAMCHARITMANAS (Ayodhyakand only). KAVITAVALI (Uttarakand only).
BHARATENDU HARISHCHANDRA:	ANDHER NAGARI
PREM CHAND	GODAN, MANSAROVAR (BHAG-EK)
JAYASHANKER "PRASAD"	CHANDRAGUPTA, KAMAYANI (Chinta, Shradha, Lajja & Ida only).
RAMCHANDRA SHUKLA:	CHINTAMANI (PAHILA BHAG) (10 Essays from the beginning).
SURAKANT TRIPATHI NIRALA:	ANAMIKA (Saroj Smriti, Ram Ki Shakti Pooja only).
S. H. VATSYAYAN AGYEYA:	SHEKHAR EK JEEVANI (TWO PARTS)
GAJANAN MADHAV MUKTIBODH:	CHAND KA MUNH TERHA HEI (‘Andhere Men’ only).

PAPER I

Section I

History of Kannada Language. What is language ? Classification of languages; General characteristics of Dravidian languages; Comparative and contrastive features of Kannada and other Dravidian languages; Kannada Alphabet; Some salient features of Kannada Grammar; gender, number, case; verbs, tense and pronouns. Chronological stages of Kannada language ; Influence of other languages on Kannada ; Language Borrowing and Semantic changes; Kannada Language and its dialects; Literary and colloquial styles of Kannada.

Section II—History of Kannada Literature

The literatures of the 10th, 12th, 16th, 17th, 19th and 20th centuries are to be studied against their social, religious and political backgrounds. And the following literary forms of Kannada with reference to their origin, development and achievement have to be critically studied on the basis of the poets listed below :

Campu:

Pampa, Ranna, Nayasena, Harihara, Janna, Andayya, Tirumalarya and Sadaksari.

Vacana :

Devar dasimayya, Basava and his contemporaries, Tontadasiddhalinga.

Ragale :

Harihara, Srinivasa—'navaratri', Kuvempu—'citrangada and sri ramayanadarsanam'.

Satpadi :

Raghavanka, Kumudendu, Camarasa, Kumaravyasa, Toravenarahari, Laksmisa and Virupaksapandita.

Sungatya:

Debaraja, Sisumayana, Nanjunda, Ratnakaravarni, Honnamma.

Prose:

Sivakoti, Camundaraya, Harihara, Tirumalarya, Kempunarayana and Muddana.

Section III—Poetics

The functional differences of poetics and criticism. Definitions and aims of poetry; Enunciation of theses of the various schools of poetry; Alankara, Riti, Vakrokti, Rasa, Dhvani and Aucitya; Definition and discussion of Rasa-sutra of Bharata; Discussion of the number of Rasas.

Aesthetic experience, the nature of genius, theory of inspiration, imagery, psychical distance, fundamental principles of criticism, the qualifications of a Sahridaya and the critic, the recent forms on Kannada literature.

Section IV—Cultural History of Karnatak

Karnatak culture against Indian background; Antiquity of Karnatak culture; ~~Abroad~~ acquaintance of the following dynasties of Karnatak; Calukyas of Badami and Kalyana, Rastrakutas, Hoysalas and Vijayanagara Kings.

Religious Movements in Karnatak; Social conditions, Art and Architecture.

Freedom Movement in Karnatak, Unification of Karnatak.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

Section I

Old Kannada

(Halagannada)

Adipuranasangraha : L. Gundappa.
Vikramarjunavijaya (cantos, 9 and 10).

Section II

Middle Kannada

(Nadugannada)

Basavannanavara Vacanagalu : Dr. L. Basavaraju.

Published by Githa Book House, Mysore-I.

Basavarajadevara Ragale: Edited by T. S. Venkannaiah.

Hariscandrakavya-sangraha: Edited by T. S. Venkannaiah and A. R. Krishna Sastri.

Udyogaparvasangraha : Edited by T. S. Shamarao.

Paramartha (Vacanas of Sarvajna) : Edited by Dr. L. Basavaraju, Gita House, Mysore.

Bharatesavaibhavasangraha (I to IV Cantos).

Section III

Modern Kannada : (Hosagannada)

Kannada Bavuta: Edited by B. M. Srikanthaiah.

Kannada-Kavyasangraha: Dr. U. R. Ananta Murthy, National Book Trust of India.

Sankramana-Hosa-Kavya: Edited by Candrasekhara Patil and others.

- Novel :* Malegalalli Madumagalu : Kuvempu. Comanadudi: Sivaram Karanta.
Bharatipura: U. R. Anantamurty.
- Short Story:* Kannadada Atyuttama Sanna Kathegalu: Edited by K. Narashimhamurthy.
- Nataka-Drama :* Asvathamam: B. M. Sri Beralgekorai : Kuvempu.
- Essay:* Hosagannada Prabbanda Sankalana : Edited by Goruru Ramaswamy Ayyangar.

Section IV

- Folk Literature:* Garatiya-hadu : Ed. by Cannamallappa and others.
Jivanajokali (Part III: garatiyaragarime)
Edited by Dr. M. S. Sunkapur.
Belaganva-jilleya-janapada-kathegalu : Edited by T. S. Rajappa.
Nmmasuttina-gadegalu : Edited by Sudhakara.
Namma-ogatugalu: Edited by Ragow (Rame Gowda).

12.(x) Kashmiri

PAPER I

1. (a) Origin and Development of the Kashmiri Language :
 - (i) Early Stages (Before Lal Ded);
 - (ii) Lal Ded and After ;
 - (iii) Influence of Sanskrit and Persian.
- (b) Structural features of the Kashmiri Language:
 - (i) Sound Patterns ;
 - (ii) Morphological formation :
 - (iii) Sentence Structure.
- (c) Dialects/Variations of the Kashmiri language.
2. Literary History and Criticism :
 - (a) Literary traditions and movements: folk and classical background : Shaivism, Rishi Cult; Sufism ; Devotional Verse; Lyricism (Particularly LO: L), Masnavi Narrative.

(b) Socio-cultural influences: Socio-political verse (including the Progressive) and the contemporary development.

(c) Development of genres :

(i) Vaakh, Shruk ; Vatsun ; Shaar ; Ladee Shah; Marsiy ; Lo; 1; Masnavi ; Leelaa, Naat ; Ghazal ; Nazam ; Aazaad Nazm; Rubaa'y, Tukh, Opera, Sonnet.

(ii) Paa'thu'r; Naatukh; Afsaanu ; Maqaalu; Tanqeed; Naaval ; Mizah and Tanz.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

1. LAL DED (Cultural Academy)
2. NOORNAAMA of Nund Rishi (C.A.)
3. Shamas Faqir: Selections (C.A.)
4. Gulrez of Maqbool Kraalawaari (C.A.)
5. SODAAM—TSARETH of Parmanand
(From Parmanand's complete Works published by C.A.)
6. KULIYAAT-i-NAADIM (C.A.)
7. RASUL MIR (Selections, published by C.A.)
8. MAHJOOR (Selections published by C.A.)
9. AAZAAD (Selections) (C.A.)
10. A'ZICHI Kaa' shi'ri Nazamu (C.A.)
11. A'ZYUK KAA' SHUR AFSAANU (C.A.)
12. KAA'SHUR NASR (C.A.)
13. SUYYA by Ali Mohd. Lone. (C.A.)
14. TSHAAY by Moti Lal Kemu
15. DO:D DAG by Akhtar Mohi-ud-Din
16. AKH DO : R by Bansi Nirdosh
17. MYUL by G. N. Gauhar
18. LAVU' TA PRAVU' by Amin Kamil'
19. PATA' LAARAAN PARBATH by Hari Krishen Kaul
20. MANI KAAMAN by Muzaffar Aazim
21. MARSIIY (Edited by Shahid Badagami)

PAPER I

Part I

(a) I. The early phase of Malayalam and its characteristics as evidenced by the reconstruction of Proto-South Dravidian Languages. The six characteristic features (*nayaas*) as enumerated by Kerala paanini (A. R. Raja Raja Varma) in relation to Tamil : The critical review of the six *nayaas* in relation to other Dravidian Languages like Kannada, Tulu etc.

II. The linguistic features of the works of the paattu school like *Rama-caritam* and their evolution as reflected in the later works of this category.

III. The linguistic features of the *Manipravaala* school beginning from the early *Sandeesa Kaavyas* up to the 15th Century. Also prose works like a *Bhasha Kautaliyam* and the early inscriptions.

IV. The linguistic features of the indigenous school comprising the early folk literature.

V. The linguistic features of the works of Niranam poets which integrate the elements of *paattu*, *Manipravaala* and the indigenous schools.

VI. The characteristic features of the modern phase as represented by *Krishnagaatha* and works of Ezhuttacchan and others.

(b) *Significant features of the Grammar of the language.*

The linguistic importance of *Liilaatilakam*. The contributions of indigenous grammarians like George Mathan, Kovunni Nedungadi, Pachu Muuthathu, A. R. Raja Raja Varma and Seshagiri Prabhu.

The contributions of European grammarians like Joseph Peet, Drummond, Gundert, Frohen meyer.

(c) The characteristic features of the dialects as mentioned in *Liilaatilakkam* and (its commentary) the caste dialects of Malayalam and those spoken in the Laccadive Islands, Mangalore, Palghat and Southern parts of the Trivandrum district.

Part II

Literary History—criticism etc.

This comprises the critical study of the literary movements and their developments from early to later periods.

1. The early literary movements including *paattu*, folklore and *Manipravaala*.
2. Gaatha.
3. Kilippaattu.
4. Champu.
5. Attakatha.

- a Thullai.
- b The Mahakaavya and the Khandakaavya.
- c Trends in modern poetry.
- d Development of drama, novel, short story, biography: travelogue and other creative prose works.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be expected to test the candidate's critical ability.

- a Kannasan (Rama Panikkar) (*Kannassa Ramayaana*, Baalakaantam).
- b Cherusseri (*Krishna Gaatha*, Rukmini Suyamvaram).
- c Shuttacchan (*Maha Bhaaratam*—Karnaparvam).
- d Nachan Nambiar (*Kalyaana Saugandhikam*).
- e Kerala Varma (*Mayura Sandeesam*).
- f Annaran Asan (*Sita*).
- g Vailathol (*Magdalana Mariyam*).
- h K. S. Parameswara Iyer (Pingala)
- i Sandu Menon (*Indulekha*).
- j C. V. Raman Pillai (*Ramaraja Bahadur*)

12. (xii) Marathi

PAPER I

LANGUAGE, HISTORY OF LITERATURE AND LITERARY CRITICISM

SECTION I: LANGUAGE

- a The origin and development of Marathi (in broad outline).
- b The major dialects of Marathi.
- c General outline of Marathi Grammar.

SECTION II: HISTORY OF LITERATURE

- a Important movements in the history of literature are to be studied, relation, wherever possible, to the thought-currents and the social life of the time.
- b From the beginnings to 1818, with special reference to the following movements: The Mahanubhawas, the Bhakti cult, the Pandit poets, the Shahirs.
- c From 1818 to 1960, with special reference to the developments in the following forms: poetry, drama, the novel, the short story.

Section III: *LITERARY CRITICISM*

The following problems in literary criticism are to be studied:

Sahityache Swaroop	(The Nature of Literature).
Sahityache Prayojan	(The Function of Literature).
Sahityanirmitchi Prakriya	(The Creative Process).
Sahitya Ani Samaj.	(Literature and Society).
Sahityachi Bhasha	(The Use of Language in Literature).
Sahityatil Navata	(Modernity in Literature)

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

- (1) Mhaimbhatta : 'Leelacharitra' : Ekanka.
- (2) Tukaram. 'Tukaram Darshan, Arthat' Abhang-Vani Prasiddha Tukayachi . (Edited by G. B. Sardar: Pub. Modern Book Depot, Pune).
- (3) Moropant: 'Virat Parva, Shlokkakavali'.
- (4) H. N. Apte: 'Pan Lakshat kon Ghetu' : 'Vajraghat
- (5) R. G. Gadkari ('Govindagraj') : 'Vagvairjayanti'; 'Ekach Pyala'.
- (6) V. S. Khandekar : 'Vayulahari', 'Kraunchvadha'.
- (7) A. R. Deshpande ('Anil') : 'Bhagnamurti'; 'Sangati'.
- (8) B. S. Mardhekar : 'Mardhekaranchi Kavita', 'Pani'.
- (9) P. L. Deshpande: 'Tuze Ahe Tujpashi' 'Khogirbharati'.
- (10) Vyankatesh Madgulkar : 'Mandeshi Manase' ; Kali Ai.

12. (xiii) Oriya

PAPER I

HISTORY OF LANGUAGE AND LITERATURE

*Part I**History of Oriya Language*

- (a) Origin and development of the language.
- (b) Significant features of the grammar of the language (Phonetics and Phonemics, Derivational and Inflectional affixes, conjugation of verb, case inflection, sandhi, structure of sentences).
- (c) Oriya dialects—Western Oriya, Southern Oriya, Desia and Bhatri, etc.

*Part II—**History of Oriya Literature*

An outline study of the history of the literature from earliest period to the modern times with emphasis on the following topics :

- (1) Religious background of Oriya Literature.
- (2) Western influence on Oriya Literature.
- (3) Typical forms of old and medieval Poetry— (Chautisa, Poi, Koili, Choupadi, Champu, etc.).
- (4) Development of Oriya Prose Literature.
- (5) Modern trends in Poetry, drama, novel, short story and literary criticism.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

1. Jaganatha Dasa . . . (Bhagavat, XI Khand)
2. Dina Krushna Dasa . . . (Rasa Kallola).
3. Brajanath Badajena . . . (Samara Taranga, Chatura Binoda).
4. Radhanath Rai. . . . (Chilika, Bibeki).
5. Fakir Mohan Senapati . . . (Mamu., Atma Jibani Charita, Galpa Salpa).
6. Gopal Chandra Praharaja . . . (Bai Mahanti Panji).
7. Kal̥ Charana Pattanayak . . . (Abhijana, Raktamati, Phatabhuin).
8. Gopinath Mahanti (Paraja, Mati Matal).
9. Satchi Rantra (Pallisri, Pandulipi, Kabita—1962).
10. Surendra Mahanti (Maralara Mrutyu, Krushna Chuda).
11. Pt. Nilakantha Das (Konarke, Arya Jibana).
12. Dr. Mayadhar Mansinha (Hemasasya, Saraswati Fakir Mohan).

12. (xiv) Persian**PAPER I**

1. (a) Origin and development of the language (in outline).
- (b) Significant features of the grammar of the language, Rhetorics, Prosody.
2. Literary History and Literary criticism—Literary movements, classical background; Socio-Cultural influences and modern trends; Origin and development of modern literary genres including drama, novel, short story, essay.
3. Short Essay in Persian.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

1. Firdausi.
Shah Nama :
(i) *Dastan Rustam wa Suhrab*
(ii) *Dastan Vizanba Maniza*
2. Nizami Aruzi Samarqaudi.
Chahar Maqala
3. Khayyam. Rabaiyat (Radif Alif, Be, Dal).
4. Minuchehri—Qasaid (Radif Lam and Mim).
5. Maulana Rum Masnunawi (1st Vol., 1st half).
6. Sadi Shirazi.
Gulistan
7. Amir Khusrau
Majmua-i-Dawawin Khusrau (Radif Alif and Te).
8. Hafiz
Diwan-i-Hafiz (1st half)
9. Abul Fazl.
Ain Akbari.
10. Bahar Mashhadi.
Diwan-i-Bahar (I Vol.) (1st half).
11. Jawal Zadeh.
Yake Bud Yake Na Bud.

NOTE: Candidates will be required to answer in Persian questions carrying not less than 25 per cent marks.

12. (xv) Punjabi

PAPER I

1. (a) Origin and development of the language—the development of tones from voiced aspirates and older vedic accent—the geminates—the interaction of Punjabi vowels and tones—Consonantal mutation in Punjabi from Sanskrit to Prakrit and Punjabi.

(b) The number-gender system—animate and inanimate—concord—different categories of postpositions—the notion of “subject” and “object” in Punjabi—Gurumukhi orthography and Punjabi word formation—noun and verb phrases—Sentence structure—spoken and written styles—sentence structure in prose and poetry.

(c) Major dialects Pothohari, Multani Majhi, Doabi, Malwai, Punjabi—the notions of dialect and idiolect-dioglossis and isoglosses—the validity of speech variation on the basis of social stratification—the distinctive features, with special reference to tones, of the various dialects—why “s”, “h”, “tonnes” and “vowels” interact in the dialects of Punjabi ?

- Classical background :* *Nath Jogi Sahi.*
- Literary movements :* *Gurmat, Sufi, Kissa and Var Literature.*
- Modern Trends :*
- Romantics and Progressives*
(Mohan Singh, Amrita Pritam, Bawa Balwant, Pritam Singh Safeer).
- Experimentalists :*
(Jasbir S. Ahluwalia, Ravinder Ravi, Sukhpalvir Singh Hasrat).
- Aesthetes*
(Harbhajan Singh, Tara Singh, Sukhbir Singh).
- Neo-progressives*
(Pash and Patar).
- Socio-Cultural Influences* *Influences of English, Sanskrit, Persian, Urdu and Hindi on Punjabi.*
- Origin & Development of Genres :*
- Epic :* (Damodar, Waris, Shah Mohammad, Vir Singh, Avtar Singh Azad, Mohan Singh).
- Drama :* (I. C. Nanda, Harcharan Singh, Balwant Gargi, S. S. Sekhon, K. S. Duggal).
- Novel :* (Vir Singh, Nanak Singh, Sohan Singh Seetal, Jaswant Singh Kanwal, K. S. Duggal, S. S. Narula, Gurdial Singh, Mohan Kahlon).
- Lyrics :* (Gurus, Sufis, and Modern Lyrists—Mohan Singh, Amrita Pritam, Shiv Kumar, Harbhajan Singh).
- Essays:* (Puran Singh, Teja Singh, Gurbakhsh Singh).
- Literary Criticism:* (S. S. Sekhon, Jasbir S. Ahluwalia, Attar Singh, Kishan Singh, Harbhajan Singh).
- Folk Literature:* Folk Songs, Folk tales, riddles, proverbs.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

- | | | |
|------------------------------------|-----|---|
| (1) Sheikh Farid | • • | The complete bani as included in the <i>Adi Grantha</i> . |
| (2) Guru Nanak | • • | Selected writings of Guru Nanak entitled, <i>Guru Nanak Bani</i> , Ed., Bhai Jodh Singh, Published by National Book Trust of India. |
| (3) Shah Hussain | • • | Kafian. |
| (4) Waris Shah | • • | Heer. |
| (5) Shah Mohammad | | Jangnama, Jang Singhan te Farangian. |
| (6) Vir Singh (Poet) | • • | Matak Hulare.
Rana Surat Singh.
Kalgidhar Chamatkar. |
| (7) Nanak Singh (Novelist) | | Chitta Lahu.
Pavittar Papi.
Ik Mian do Telwaran |
| (8) Gurbakhsh Singh
(Essayist) | • • | Zindgi di Ras.
Manzil di Pai
Merian Abhul Yadaan. |
| (9) Balwant Gargi
(Dramatist). | • • | Loha Kutt.
Dhuni di Agg.
Sultan Razia. |
| (10) Sant Singh Sekhon
(Critic) | | Damyanti.
Sahityarath.
Baba Asman. |

12. (xvi) Russian

PAPER I

- A. (i) Essay 30 marks
 (ii) Precis 20 marks

B. Literary History and Literary criticism—Literary movements, Romanticism, critical realism, socialist realism; *Socio-Cultural influences and modern trends*. Origin and development of literary genres including epic, drama, novel, short story, lyric, essay, folk literature.

Note:— There will be two questions of which at least one will have to be answered in Russian.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

- | | |
|------------------------------|--|
| (1) A.S. Pushkin | (i) Evgeny Onegin.
(ii) Bronze Horseman. |
| (2) M. U. Lermontov | Hero of our Time. |
| (3) N. V. Gogol | Dead souls. |
| (4) I. S. Turgenev | Fathers and Sons. |
| (5) F. M. Dostoevsky | Crime and Punishment. |
| (6) L. N. Tolstoy | Anna Karenina. |
| (7) A. P. Chekhov | (i) Cherry Orchard.
(ii) Ward No. 6. |
| (8) A. M. Gorky | (i) Lower Depths.
(ii) Mother. |
| (9) B. B. Maykovsky | (i) You.
(ii) Cloud in Pants.
(iii) V. I. Lenin.
(iv) Good. |
| (10) M. Sholokhov | (i) Quite flows the Don.
(ii) Fate of a man. |

NOTE: Questions from this paper should be answered in Russian.

12. (xvii) Sanskrit

PAPER I

There will be four sections—

(1) (a) Origin and development of language (from Indo-European to middle Indo-Aryan languages) (General outline only).

(b) Significant features of the grammar with particular stress on Sandhi Karaka, Samasa and Vachya (Voice).

(2) General knowledge of literary history and Principal trends of literary criticism. Origin and development of literary genres, including epic, drama, Prose, Kavya, Lyric and Anthology.

(3) Essentials of Ancient Indian Culture and Philosophy with special stress on :

Varnashrama Vyavastha, Sanskaras and principal philosophical trends.

(4) Short essay in Sanskrit.

NOTE: Questions on sections (3) and (4) are to be answered in Sanskrit.

(1) General study of the following works :

- (a) Kathopanisad.
- (b) Bhagavadgita.
- (c) Buddhacharita—(Asvaghosha).
- (d) Svapn vasavadatta—(Bhasa).
- (e) Abhijhasakuntala—(Kalidasa).
- (f) Meghaduta—(Kalidasa).
- (g) Raghuvansa—(Kalidasa).
- (h) Kumarasanbhava—(Kalidasa).
- (i) Mrechakatika—(Sudraka).
- (j) Kiratarjuniya—(Bharavi).
- (k) Sisupalavadha—(Magha).
- (l) Uttararamacharita—(Bhavabhuti).
- (m) Mudraraksasa—(Visakhadatta).
- (n) Naisadhacharita—(Sriharsa).
- (o) Rajatarangini—(Kalhana).
- (p) Nitishataka—(Bhartrhari).
- (q) Kadambari—(Banabhatta).
- (r) Harsacharita—(Banabhatta).
- (s) Dasakumaracharita—(Dandin).
- (t) Prabodhachandrodaya—(Krishna Misra).

(2) Evidence of first hand reading of the following selected texts—

Texts for reading (textual questions will be asked from these portions only).

1. Kathopanisad III Valti—Verses 10 to 15.
2. Bhagwatgita II Chapter (13 to 25 verses).
3. Buddhacharita I (1 to 10 verses).
4. Svapna Vasavadattam (7th Act).
5. Abhijnana Shakuntalam (4th Act).
6. Meghaduta (1 to 10 opening verses).
7. Kiratarjuniyam (1st canto).
8. Uttara Ramacharitam (3rd Act).
9. Nitishataka (1 to 10 verses).
10. Kadambari (Shukanasopadesha).
11. Kautilya Arthashastra (2nd and 11th Adhyayas of 1st Adhikarana).

Note to item No. 2: Questions carrying minimum of 25 %, marks should be answered in Sanskrit.

12. (xviii) Sindhi

PAPER I

- (1) (a) Origin and development of the Sindhi language—different views.
- (b) Significant features of the Sindhi language—Elementary knowledge of the phonological and grammatical structure of Sindhi.
- (c) Major dialects of the Sindhi language.
- (d) Sindhi Vocabulary—stages of its growth.
- (e) Scripts used for Sindhi and their development.
- (2) (a) Development of Sindhi literature: Early Medieval and Modern periods.
- (b) Socio-cultural influences on Sindhi literature in different periods.
- (c) Origin and development of literary genres in Sindhi : Poetry, Short story, novel, drama, essay, criticism, biography.
- (d) Sindhi folk literature: ballads, folk songs, folk tales, proverbs.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

- | | |
|---|---|
| (1) Shah Abdul Latif : | Latifi Laaf (Selections from Shah). |
| (2) Sami: | Samia ja Choonda Shloka (pub. by Sahitya Akademi). |
| (3) Sachal : | Sachal jo Choonda Kalaam (pub. by Sahitya Akademi). |
| (4) Kishinchand Bewas : | Shair Bewas (Poems). |
| (5) Narayan Shyam : | Maak Bhina Raabel (Poems). |
| (6) Hotchand Gurbuxani : | Noorjahan (Novel).
Muqadame Latifi (Essays).
Rooha Rihana (Folk Lit.) |
| (7) Ram Panjwani: | Aahe Na Aahe (Novel). |
| (8) Assanand Mantora: | Shair (Novel). |
| (9) M. U. Malkani: | Jiwan Chahichita (Plays).
Khurkhubita Pya Timkani (Plays). |
| (10) Tirth Basant: | Vasanta Varkha (Essays) . |
| (11) H. T. Sadarangani: | (1) Rangeen Rubaiyoon (Poetry).
(2) Kakha ain Kana (Essays). |
| (12) Gobind Malhi and Kala Rijhsinghani (Ed.) | Sindhi Choonda Kahanyoon.
(Pub. by Sahitya Akademi) (Short Stories). |

PAPER I

1. (a) *Origin and Development of Tamil language*

- (1) A short sketch on the major language families in India; the place of Tamil among the Indian languages in general and Dravidian in particular; various opinions about the affiliation of Dravidian languages; Geographical position and distribution of Tamil; Etymological history of the word Tamil; Origin and the development of Tamil Script.
- (2) Major changes in sound and grammatical structure from Proto-Dravidian to Tamil; major changes in the sound, grammatical systems and lexical items of Tamil from Sangam age to modern period as evidenced through various literary and inscriptional sources.
- (3) Development of Tamil in the modern period.

1. (b) *Significant features of the Grammar of Tamil*

- (1) The significance of three-fold classification of Tamil grammar viz. eluttu, col. and porul.
- (2) The structures of various types of sentences viz., simple, complex, compound, interrogative, imperative, equational etc.
- (3) The important role played by various verbal and relative participles in the structure of Tamil Sentences.
- (4) The structures of verb phrases and noun phrases.
- (5) Morphology of nouns, verbs, adjectives and adverbs.
- (6) The sound system of Tamil; identification of phonemes and their distribution. The syllabic patterns; major laws of sandhi.

1. (c) *Major dialects*

Languages vs. dialect.

Literary dialects vs. spoken dialects.

various kinds of dialects viz. social, regional etc. and their major differences.

2. (1) History of Tamil Literature (Sangam age, Age of Epics). The Ethical Literature. The Bakthi Literature. (Nayanmars and Alvars).

The Chola period, Minor poetry and modern period.

(2) Literary principles (Indigenous and western). Literary conventions of Akam and Purañ. Five Thinais and their significances.

(3) The impacts of various religious socio and political conditions on the development of various literary movements.

(4) Major literary genres (their origin and development).

Lyrics, Epics, various prabandams, short story, Novel, Essay and Folk literature.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

1. Thiruvalluvar Kural (Kamattuppal).
2. Ilangavodigal Cilappatikairam (Vanchikkantam).
3. Kambar Kambaramayanam (Kukappatalam).
4. Cekkilar Periyapuranam.
(Tatuttatkonta Puranam).
5. Barathi Panchali Cabadam.
6. Barathidasam Kutumpa Vilakku.
7. Thiru. Vi. Ka Murugan allatuzhagu.
8. Kalki Sivakamiyin Sabadam.
9. M. Varadarajan . . . Akal Vilakku.

12.(xx) Telugu

PAPER I

(1) (a) *Origin and development of the Telugu language*

- (i) The place of Telugu among the language families of India in general and the Dravidian family in particular—Geographical position and distribution—Etymological History of the names Telugu, Tenuga and Andhra.
- (ii) Major changes in Sound and grammatical systems from Proto-Dravidian to old Telugu.
- (iii) History of Telugu through the ages as evidenced through inscriptions and literary sources (from the beginning to the end of the 15th century).
- (iv) History of the development of Telugu from the 16th century to the Modern Period.
- (v) Modern Period: Evolution of Telugu through linguistic and literary movements (like the spoken Telugu movement, etc.)

(b) *Significant features of the grammar of the language*

- (i) Major divisions of Telugu sentences (Simple, complex and compound; Declarative, Imperative, etc.). Equational and non-equational sentences.
- (ii) Word order in Telugu—Relative Order of various grammatical categories—change of normal word order and other modes of focussing.
- (iii) Use of various participles in Telugu (Perfective, Durative etc.). Nominalizations and Relativization.

(iv) Reported speech (Direct and Indirect).

(v) Morphology of Nouns and Verbs : Pluralisation base formation
Formation of finite and non-finite verbs.

(vi) Phonology: Phonemes and their distribution and pronunciation ;
Sandhi processes.

(c) *Major Dialects of Telugu/Varieties of the language*

Regional and social variations in Telugu—Lexical, Phonological and Grammatical Characteristics of each variety.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

1. Nannaya Andhra Mahabharatamu
Adiparvamu prathmasvasamu (I Book—
I Canto).
2. Tikkana Andhra Mahabharatamu
Virataparvamu—Dvitiyasvasamu
(III Book—II Canto).
3. Potana Andhra Mahabharatamu prathama
Skanthamu— (I Book) Verses 1—110.
4. Peddana Manucharitramu—Dvitiyasvasamu (II Canto).
5. Dhurjati Kalahastiswara Satakamu.
6. Rayaprolu Subbarao Andhravali
7. Gurajada Apparao Kanyasulkam
8. Nayani Subbarao Matru gitalu
9. G. V. Chalam Savitri
10. Sri Sri Mahaprasthanam

12.(xxi) Urdu

PAPER I

- (a) The coming of the Aryans in India—the development of the Indo-Aryan through three stages—Old Indo-Aryan (OIA), Middle Indo-Aryan (MIA) and New Indo-Aryan (NIA)—Grouping of the New Indo-Aryan languages—Western Hindi and its dialects—Khari Boli, Braj Bhasha and Haryani—Relationship of Urdu to Khadi—Perso-Arabic elements in Urdu—Development of Urdu from 1200 to 1800 in the North and 1400 to 1700 in the Deccan.
- (b) Significant features of Urdu Phonology—Morphology Syntax—Perso-Arabic elements in its phonology, morphology and Syntax—its vocabulary.

- (c) Dakhani Urdu—Its origin and development—its significant linguistic features.
- (d) The significant features of the Dakhani Urdu literature (1450—1700)—The two classical backgrounds of Urdu Literature—Perso-Arabic and Indian—Mynavi, Indian tales—the influence of the West on Urdu literature—classical genres—Ghazal, Masticism—Qasida, Rubai, Qitaa, Prose, Fiction. Modern genres—Blank Verse, Free Verse, Novel, Short Stories, Drama, Literary criticism and Essay.

PAPER II

This paper will require first-hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

PROSE

1. Mir Amman Bagh-O-Bahar
2. Ghalib Khatut-e-Ghalib
(Anjuman Tarraqi-e-Urdu)
3. Hali Muqaddama-e-Sher-o-Shairi
4. Ruswa Umra-O-Jan Ada
5. Prem Chand Wardat
6. Abul Kalam Azad Ghubar-e-Khatir
7. Imtiaz Ali Taj Anar Kali

POETRY

8. Mir Intikhab-e-Kalam-e-Mir
(Ed. Abdul Haq)
9. Sauda Qasaid (including Hajwiyat)
10. Ghalib Diwan-e-Ghalib
11. Iqbal Bal-e-Gibrail
12. Josh Malihabadi Saif-O-Subu
13. Firaq Gorakhpuri Ruh-e-Kainat
14. Faiz Kalam-e-Faiz (Complete)

13. Management

PAPER I

PART A

GENERAL MANAGEMENT

The applicant should make a study of the development of the field of management as a systematic body of knowledge and acquaint himself adequately with the contributions of leading authorities on the subject. He should

study the role and functions of management and relevance of the known concepts and theories in the Indian context. Apart from general concepts, the students should study in detail the various aspects of management as described below :

1. *Organisational behaviour*

Significance of social psychological factors for understanding organisational behaviour. Relevance of theories of motivation: Contribution of Maslow, Herzberg, McGregor, McClelland and other leading authorities. Research studies in leadership.

Small group and intergroup behaviour. Application of these concepts for understanding the managerial role, conflict and cooperation, work norms, and dynamics of organisational behaviour.

Organisational Design : Classical, neo-classical and open systems theories of organisation. Centralisation, decentralisation, delegation, authority and control and major experiments of organisational change in India and abroad. Major approaches to organisational change: managerial grid, MBO and others.

2. *Quantitative Methods*

Classical Optimization : maxima and minima of single and several variables; optimization under constraints—Applications. Linear Programming: Problem formulation—Graphical Solution—Simplex Method Duality —Post optimality analysis — Applications of Integer Programming and dynamic programming—Formulation of Transportation and assignment Models of linear programming and methods of solution.

Statistical Methods : Measures of Central tendencies and variations—Application of Binomial, Poisson and Normal distributions. Time series—Regression and correlation—Tests of Hypotheses.—Decision making under risk: Decision Trees—Expected Monetary Value—Value of Information—Application of Bayes' Theorem to posterior analysis. Decision making under uncertainty. Different criterion for selecting optimum strategies.

3. *Economic Analysis*

National income analysis and its use in business forecasting—Regulatory policies : monetary, fiscal and planning, and the impact of such macro-policies on enterprise decisions and plans—Demand analysis and forecasting, cost analysis, pricing decisions under different market structures—Pricing of joint products and price discrimination—capital budgeting—applications under Indian conditions.

OR

PART B

Case study

Note:—The candidates would be required to indicate at the time of making the applications whether they would answer Part A or Part B.

The candidates would be required to answer only two out of four parts.

PART I

Marketing Management

Marketing and Economic Development—Marketing Concept and its applicability to the Indian economy—Major tasks of management in the context of developing economy—Rural and Urban marketing, their prospects and problems.

Planning and strategy in the context of domestic and export marketing—concept of marketing MIX - Market Segmentation and Product differentiation strategies—Consumer motivation and Behaviour—Consumer Behavioural models—Product, Brand, distribution ; public distribution system, price, and promotion.

DECISIONS—Planning, and control of marketing programmes—Marketing research and models—Sales Organisational dynamics.

Export incentives and promotional strategies—Role of Government, trade associations and individual organisations—problems and prospects of export marketing.

PART II

Production And Materials Management

Fundamentals of Production from management point of view. Types of Manufacturing systems: continuous—repetitive, intermittent. Organising for Production, Long range, forecast and aggregate Production Planning. Plant Design : process planning, plant size and scale of operations, location of plant, Layout of physical facilities. Equipment replacement and maintenance.

Functions of Production Planning and Control, Routing, Loading and Scheduling for different types of production systems. Assembly line balancing, Machine Line Balancing.

Role and Importance of materials management, Material handling, Value Analysis, Quality Control, Waste and Scrap disposal. Make or Buy decisions, Codification, Standardisation and spare parts inventory. Inventory control—ABC analysis, Economic order quantity, Reorder point. Safety stock. Two Bin system.

Use of the Quantitative Techniques like Linear Programming, Queueing Theory, PERT/CPM and Systems Simulation to study the above topics.

PART III**Financial Management**

General tools of Financial Analysis: Ratio analysis, funds flow analysis, cost-volume-profit analysis, cash budgeting, financial and operating leverage.

Investment Decision : Steps in capital expenditure management, criteria for investment appraisal, cost of capital and its application in public and private sectors. Risk analysis in investment decisions, organisational evaluation for capital expenditure management with special reference to India.

Financing Decision: estimating the firms of financial requirements, financial structure determinations, capital markets, institutional mechanism for funds with special reference to India, security analysis, leasing and sub-contracting.

Working Capital Management : Determining the size of working capital, managing the managerial attitude towards risk in working capital, management of cash, inventory and accounts receivables, effects of inflation on working capital management.

Income Determination and Distribution : Internal financing, determination of dividend policy, implication of inflationary tendencies in determining the dividend policy, valuation and dividend policy.

Financial management in Public Sector with special reference to India.

Industrial Finance in India.

Performance budgeting and principles of financial accounting. Systems of management control. Long range planning.

PART IV**Personnel Management**

Functions of Personnel Management—Personnel Policies—Man-Power Planning—employee appraisal Recruitment and Selection Techniques and practices prevailing in private and public sectors enterprises in India—Training and Development—Promotions—Job Evaluation—Wage and Salary Administration—Employee Morale and Motivation—Conflict Management.

Changing Pattern of Industrial Relations in India—Management Styles in India—Trade Unionism in India—Labour Legislation with special reference to Factories Act, Workmen's Compensation Act, Industrial Disputes Act, Payment of Wages Act, Bonus Act, etc.—Workers' participation in Management—Collective Bargaining—Discipline in Industry—Government's tripartite labour machinery and its role.

PAPER I

Any five questions may be attempted out of 12 questions to be set in the paper.

1. Linear Algebra—Vector spaces, Linear independence, bases, dimension of a finitely generated space. Linear transformation, matrices and their algebra. Row and column reduction, Echelon form, Rank and nullity of a linear transformation. Solution of system of homogeneous and non-homogeneous linear equations. Cayley Hamilton theorem, Eigen-values and Eigenvectors.

2. Calculus—Real numbers, limits, continuity, differentiability. Indefinite integration. Mean value theorems, Taylor's theorem. Indeterminate forms. Maxima and minima. Curve tracing. Asymptotes. Definite integrals. Functions of several variables, partial derivatives, maxima and minima. Jacobian. Double and triple integration (techniques only). Application to Beta and Gamma Functions, areas, volumes, centre of gravity, etc.

3. Analytical Geometry of two and three dimensions—First and second degree equations in two dimensions in Cartesian and Polar coordinates. Plane, sphere and other quadric surface in standard forms in three dimensions.

4. Differential equations—Picard's existence theorem (without proof), Initial and boundary conditions, Linear differential equations with variable co-efficients, Integration in series. Bessel and Legendre functions—their elementary properties. Total and simultaneous differential equations.

Fourier series, Fourier Transform. Laplace transform, the convolution theorem, Inverse transform. Solution of ordinary differential equations by using transforms.

5. Vector, Tensor, Mechanics and Hydrostatics—

- (i) Vector Analysis :—Vector Algebra, Differentiation of vector function of a scalar variable, Gradient, divergence and curl in cartesian, cylindrical and spherical coordinates and their physical interpretation. Higher order derivatives. Vector identities and Vector equations. Gauss and Stokes Theorems.
- (ii) Tensor Analysis : Definition of a Tensor, transformation of coordinates, contravariant and Co-variant vectors, addition and multiplication of tensors, contraction of tensors, inner product, fundamental tensor, christoffel symbols, co-variant differentiation, Gradient divergence and curl in tensor notation.
- (iii) Statistics:—Equilibrium of system of particles. Work and potential energy. Friction. Common catenary. Principle of Virtual work. Stability of equilibrium. Equilibrium of forces in three dimensions.
- (iv) Dynamics:—Degrees of freedom and constraints. Rectilinear motion. Simple harmonic motion. Motion in a plane. Projectiles. Constrained motion. Work and energy. Motion under impulsive forces. Kepler's laws. Orbits under central forces. Motion of varying mass. Motion under resistance.
- (v) Hydrostatics:—Pressure of heavy fluids. Equilibrium of fluids under given system of forces. Centre of pressure. Thrust on curved surfaces. Equilibrium of floating bodies. Stability of equilibrium. Pressure of gases and problems relating to atmosphere.

PAPER II

Candidates will have to answer any five questions. The paper will be in two sections. Section A will contain nine questions and Section B will contain six questions.

Section A

Algebra including Linear Algebra Analysis including complex Variables
Partial Differential Equations Geometry

Section B

Mechanics and Hydro-Dynamics Statistics and Operational Research

Algebra :

Sets, maps, relations, equivalence relations, binary relations, groups, sub-groups, Lagrange's theorem, Cyclic groups, normal subgroups, quotient groups, fundamental theorem of homomorphisms, isomorphism theorems of groups, inner automorphisms, Conjugate elements, conjugate subgroups, class equation, Rings, subrings, integral domains, quotient field, ideals, isomorphism theorem, Fields and Finite fields.

Vector spaces, Linear transformations, matrices characteristics and numerical Polynomials, Equivalence, Congruence and similarity. Reduction to canonical forms, specially diagonalisation.

Orthogonal, Symmetrical, Skew symmetrical, Unitary, Hermitian and skew-Hermitian matrices—Their eigenvalues, Orthogonal and unitary reduction of quadratic and Hermitian forms, positive definite quadratic forms, Simultaneous reduction.

Analysis: Metric spaces, their topology with special reference to \mathbb{R}^n , Sequences in a metric space, Cauchy sequences, completeness, completion, continuous functions, uniform continuity, properties of continuous functions on compact sets, Riemann-Stieltjes Integral, Improper integrals and their conditions of existence, Differentiation of functions of several variables, Implicit function theorem, maxima and minima, Integration, Absolute and conditional convergence of series of real and complex terms, Rearrangement of series, uniform convergence, infinite products, continuity, differentiability and integrability for series.

Functions of a Complex variable : Analytic functions, Cauchy's theorem, Cauchy's integral formula, Taylor's and Laurent's series, Singularities, Cauchy's Residue theorem and Contour integration.

Differential Equations :

Formation of partial differential equations, Types of integrals of partial differential equations, Partial differential equations of first order, Charpit's methods, Partial differential equation with constant coefficients, Monge's method, Classification of partial differential equations of second order, Laplace equation and its boundary value problems, Standard solutions of wave equation and equation of heat conduction.

Geometry: The quadric surface and its analysis, Curves in space, Curvature and torsion, Frenet's formulae, Envelopes, Developable surfaces, Developable Surfaces associated with a curve, Ruled surfaces, Curvature of surfaces, Lines of Curvature, Conjugate lines, Asymptotic lines, Geodesics.

Mechanics: Generalized co-ordinates; constraints, holonomic and non-holonomic systems D'Alembert's principle and Lagrange's equations. Basic ideas of calculus of variations; Hamilton's principle and derivation of Lagrange's equations from Hamilton's principle; extension of Hamilton's principle; extension of Hamilton's principle to non-conservative and non-holonomic systems. The two-body central force problem; reduction to the equivalent one body problem; Kepler's problem, Kinematics of a rigid body; Eulerian angles, Dynamics of a rigid body; the inertia tensor and moment of inertia; Euler's equations, motion of a top, Hamilton's equations. Theory of small oscillations.

Hydrodynamics:

General: Equation of continuity, momentum and energy.

Inviscid Flow Theory: Two-dimensional motion, streaming motion. Sources and sinks. Method of images and its application. Motion of cylinder and sphere in a fluid. Vortex motion. Waves.

Viscous Flow Theory: Stress and Strain analysis. Navier-Stokes Equations. Vorticity, Dissipation of energy. Flow between parallel plates. Flow through pipe. Slow streaming motion past a sphere. Boundary-layer concept. Boundary-layer equations for two dimensional flows, boundary-layer along a plate. Similarity solutions; Momentum and energy integrals. Method of Karaman and Pohlhausen.

Probability and Statistics:

(1) *Statistical Methods:* Concepts of statistical population and random sample. Collection and presentation of data. Measures of location and dispersion. Moments and Sheppard's corrections. Cumulants. Measures of Skewness and Kurtosis.

Curve fitting by least squares. Regression, correlation and correlation ratio. Rank correlation. Partial correlation coefficient and Multiple correlation coefficient.

(2) *Probability:* Discrete sample space. Events; their union and intersection, etc. Probability—classical, relative frequency and axiomatic approaches. Probability in continuum. Probability space. Conditional probability and independence. Basic laws of probability. Probability of combination of events. Baye's theorem. Random variable, Probability function. Probability density function. Distribution function. Mathematical expectation. Marginal and conditional distributions. Conditional expectation.

3. *Probability distributions:* Binomial, Poisson, Normal, Gamma, Beta, Cauchy, Multinomial, Hypergeometric, Negative Binomial, Chebychev's lemma, (Weak) law of large numbers, Central limit theorem for independent and identical variates. Standard errors. Sampling distributions of t , F and Chi-square and their uses in tests of significance. Large sample tests for mean and proportion.

(4) *Sample Surveys*: Sampling frame ; Sampling with equal probability with or without replacement. Stratified sampling. Brief study of two-stage, systematic and cluster sampling methods. Regression and ratio estimates.

Design of experiments: Principles of experimentation. Analysis of variance. Completely randomized, Randomized block and Latin square designs.

Operational Research

General

Scope of Operational Research. Construction of Models and general methods of solution.

Mathematical Programming

Definition and some elementary properties of convex sets, simplex methods, degeneracy, duality and sensitivity analysis, Rectangular games and their solution. Transportation and assignment problems. Kuhn-Tucker conditions. Non-linear programming, Solution of quadratic programming problems by Beales and Wolf's methods. Bellman's optimality principle and some elementary applications of dynamic programming.

Production and Inventory Control

Analytical structure of inventory problems; Production and inventory control when demand is deterministic and stochastic with and without lead time, Price breaks.

Theory of Queues

Analysis of steady-state and Transient solutions for Queueing system with Poisson arrivals and exponential service time. Machine interference problems and its use in practice. Deterministic replacement models, Sequencing problems with two machines, n jobs, 3 machines, n jobs (special case) and n machines, two jobs.

15. Philosophy

PAPER I

Metaphysics and Epistemology

Candidates will be expected to be familiar with theories and types of Epistemology and Metaphysics—Indian and Western—with special reference to the following:—

(a) Western

Idealism ; Realism ; Absolutism ; Empiricism ; Logical positivism ; Analysis ; Phenomenology ; Existentialism and Pragmatism.

(b) Indian

Prama and Pramanya ; Theories of reality with reference to main systems (Orthodox and Heterodox) of Philosophy.

PAPER II

Socio-Political Philosophy and Philosophy of Religion

1. Nature of Philosophy ; its relation to life, thought and culture.
2. The following topics with special reference to the Indian context including Indian Constitution:

Political Ideologies	Democracy, Socialism, Fascism, Theocracy, Communism and Sarvodaya.
Methods of Political Action	Constitutionalism, Revolution, Terrorism and Satyagrah.
3. Tradition, Change and Modernity with reference to Indian Social Institutions.
4. Philosophy of Religion:
 - (a) Theology and Philosophy of Religion.
 - (b) Foundations of religious belief : Reason, Revelation, Faith and Mysticism.
 - (c) God, Immortality of Soul, Liberation and Problem of Evil.
 - (d) Equality, Unity and Universality of Religions; Religious tolerance; Conversion ; Secularism.

16. Political Science

PAPER I

Political Theory

1. Plato ; Aristotle ; Machiavelli ; Hobbes ; Locks ; Rousseau ; Hegel ; Bentham ; J. S. Mill; Green; Marx; Lenin.
2. Scientific Study of Politics ; Behaviouralism and post-behavioural developments ; Systems theory and other recent approaches to political analysis; Marxist approach to political analysis.
3. The Emergence and Nature of the Modern State ; Sovereignty ; Law.
4. Political Obligation ; Resistance and Revolution ; Rights ; Property Liberty ; Equality; Justice.
5. Theory of Democracy.
6. Liberalism ; Evolutionary Socialism (Democratic and Fabian); Marxian Socialism ; Fascism.

PAPER II

Government and Politics with special reference to India

1. THEORY OF COMPARATIVE POLITICS : Political System—Traditional approach, Structural-Functional approach and the Marxian approach.
2. POLITICAL INSTITUTIONS : The Legislature, Executive and Judiciary ; Parties and Pressure-Groups; Electoral system; Leadership; Classes and Political Elites; Bureaucracy.
3. POLITICAL PROCESS : Political Socialization : Political Communication ; Public Opinion and Mass Media ; Political Change.
4. INDIAN POLITICAL SYSTEM : (a) *The Roots* : Colonialism and nationalism in India; and the Political Philosophy of the National Movement—Gokhale, Tilak, Gandhi and Jawaharlal Nehru.
 (b) *The Structure*: Historical and ideological basis of the Constitution; Fundamental Rights and Directive Principles ; Union Government; Parliament, Cabinet, Supreme Court and Judicial Review ; Indian Federalism and its problem—distribution of powers; Centre-State relations; State Government—role of the Governor ; Panchayati Raj.
 (c) *The Functioning* : Bureaucracy—its role and problems ; Political process ; Political parties and political participation ; Pressure-Groups; Politics of Caste, Communalism, Language and Regionalism ; Problems of Secularization of the polity and national integration ; Planning and Performance ; Indian democracy and the nature of the socio-economic change in India.

17. Physics

PAPER I

Mechanics, Thermal Physics, Waves and Oscillations

Mechanics: Galilean transformation, concept of mass and Newton's laws of motion, Conservation Laws; Motion of rigid bodies; Coriolis force; gyroscope. Kepler's laws; gravitation ; measurement of G. artificial satellites. Fluid motion, Bernoulli's theorem, circulation, Reynold number, turbulence. Viscosity ; surface tension. Elasticity. Relativistic mechanics and simple applications ; elements of general relativity.

Thermal Physics : Perfect gas, Van der Waals equation. Laws of thermodynamics. Gibbs phase rule, chemical equilibrium. Production and measurement of low temperatures. Kinetic theory of gases ; Brownian motion. Black body radiation, Planck's law. Specific heat of gases and solids. Thermionic emission. Fermi-Dirac and Bose-Einstein distribution laws. Superfluidity. Thermal ionization. Elements of irreversible thermodynamics. Solar energy and its utilization.

Waves and oscillations: Oscillations with one and two degrees of freedom; forced vibrations and resonance. Wave motion. Fourier Analysis. Phase and group velocity.

Huyghens principle. Reflection, refraction, interference, diffraction and polarization of waves. Optical instruments and resolving power. Multiple beam interference. E. M. Wave equation, Fresnel's formulae, normal and anomalous dispersion. Coherence, laser and its applications.

PAPER II

*Electricity, Magnetism, Atomic Physics and Electronics**Electricity and Magnetism:*

Potential and Laplace's equations and simple applications. Dielectric polarization, capacitors. Dia-para- and ferro-magnetic materials. Kirchhoff's laws. Ampere's law, Faraday's laws of electromagnetic induction. AC circuits, alternating currents. Maxwell's equations. Wave guides and resonators.

Atomic Physics:

Bohr's theory, Electron spin, Lande's g factor. Pauli's principle. Periodic table. Spectre of one and two valence electron systems. Zeeman effect. Stark effect. Elements of X-ray spectra. Compton scattering. Photoelectric effect, wave-particle duality, Schrodinger's equation and simple solutions. Uncertainty principle. Dirac's equation for electron.

Properties and structure of nuclei, mass spectrometry, radioactivity, decay of α , β and γ decay, properties of neutrons, neutrons scattering. Electron microscope, nuclear fission and reactors, nuclear fusion, cosmic ray shower production. Simple properties of elementary particles. Symmetry and physical laws: parity violation. Superconductivity and Josephson effect.

Electronics:

Thermion emission from solids, Child-Langmuir Law. Static and dynamic characteristics of diodes, triodes, tetrodes and pentodes; thyatron. Band structure of metals and semiconductor, doped semiconductor; p-n diodes, junction diodes.

Vacuum tubes and transistor) circuits for rectification, amplification, modulation and detection of r.f. waves. Basic principles of reception and transmission. Television. Elementary principles of solid state device.

18. Psychology

PAPER I

General Psychology. Schools and Systems of Psychology. Recent trends in Psychology.

Structure and functions of cells. Neuronal physiology. Nervous system. The endocrine system. Theories of vision and audition.

Learning—classical & operant. Reinforcement. Avoidance conditioning. Extinction. Discrimination learning. Imprinting. Theories of learning—Thorndike, Hull, Skinner and Tolman. Verbal learning. Memory learning. Concept learning. Perceptual learning. Transfer of interference. The mediation process.

4. Nature of motives and emotions. Homeostasis. Biogenic and social motives. Measurement of human motivation. Theories of motivation—Maslow, Lewin & Freud. Theories of emotion.
 5. Nature of perceptual organisation. Perception of colour and shape movement and space. Perceptual constancy. Effect of learning and motivation on perception.
 6. Short term and long term memory. Qualitative changes in memory. Theories of forgetting.
 7. The thinking process. Piaget's view on thinking. Language and thought. Nature and types of concepts. Concept attainment and measurement of concepts. Problem-solving. Set in thinking. Reasoning.
 8. Nature and determinants of personality. Factors in development of personality. Traits and types. Self-concept.
- Theories of personality—Neo-Freudian, Murray, Allport, Cattell. Types of personality tests and their rationale.

PAPER II

(A) SOCIAL PSYCHOLOGY AND PSYCHOLOGY OF CRIME

Social Psychology

1. Socialisation—Social learning & Social control. Society and personality.
2. Beliefs. Stereotypes, opinions and attitudes, Attitude measurement and change-communication and persuasion.
3. Structure & functions of group. Role-status relations. Group norms. Group solidarity. Intergroup tension. International tension.
4. Leadership-definition. Leader-follower relation. Leadership and social power. Leadership characteristics and styles, specificity or generality of leadership behaviour. Effectiveness of leadership. Training for leadership.
5. Inter-personal perception and attraction. Self-perception.
6. Social movements—process—product—change.

Psychology of Crime

1. Origins of criminal behaviour ; Evolution of criminal psychology. Development of criminal predisposition. The concept of crime & criminal sociological, biological and psychological factors in causation of crime. Psycho-analytic point of view.
2. Assessing criminal predispositions : Psychological test—intelligence, personality and other diagnostic tests. Special problems in testing criminal suspects.
3. Juvenile delinquency : Nature, determinants, treatment. Role of Psychologists in juvenile courts and treatment institutions.
4. The Psycho-pathic personality—Nature, determinants, treatment.
5. The drug addict, the alcoholic offender, the sex offender. Their characteristics, causation and treatment.
6. Current practices in correction—New developments in correction.

OR

(B) CLINICAL PSYCHOLOGY AND PSYCHOPATHOLOGY*Clinical Psychology*

1. The Field of Clinical Psychology ; Relations of Clinical Psychology to Psychology of Personality, Psychopathology, mental health and the community, mental health movement. Counselling psychology and clinical psychology; professional roles of clinical psychologists.
2. Goals of Clinical Diagnosis. Personality Assessments. Behavioural Assessment ; Nature of Clinical Judgement ; Sources of information in clinical diagnosis. Assessments of organisations, institutions and environment.

Therapies : Somatic therapies, environmental therapies, psychotherapies—psychoanalytic, phenomenological—existential, gestalt, rational—emotive. Behaviour therapy and behaviour modification. Group therapies.

Research : A broad idea of diagnostic, therapeutic and etiological research.

Professional issues : The nature of professional preparation for clinical psychological work. ethical standards, and legal issues.

Psychopathology

1. Concept of abnormality—popular & scientific.
2. The Pre-Freudians. Contributions of Freud, Adler & Jung. The Neo-Freudian : Horney, Sullivan & Fromm.
3. Experimental Studies of Psychopathological phenomena—classical and instrumental conditioning and social learning theories approaches.
4. Biological and sociological factors in maladjustment.
5. Psychoneurotic disorders. Psychoses. Character disorders. Disorders of the brain. Psychosomatic disorders.
6. Mental retardation.

OR

(C) INDUSTRIAL PSYCHOLOGY AND ORGANISATIONAL PSYCHOLOGY*Industrial Psychology*

1. Nature of the work situations: work, vocation, personality and society.
2. The working environment : Illumination. Atmospheric conditions. Noise. Human factors in equipments design. Spatial layout of work. Display problems. Group dynamics in industry.
3. Works Methods : Time and motion study. Modern approaches to methods of work ; work schedule.

4. Work efficiency: Fatigue monotony and boredom. Accident—causes and prevention. Labour turn-over. Work incentives. Job satisfaction.
5. Personal preparation : Basic problems and approaches in developing a selection programme. Psychological tests in personnel selection. Biographical data in personnel appraisal—interviewing, Personnel development and training.
6. Consumer Behaviour : Emotional and motivational factors in buying behaviour. Personal Salesmanship. Consumer behaviour surveys. Advertising research — perceptual and cognitive factors in advertising.

Organisational Psychology

1. Perspectives on organization—definition—approaches—clients of organization.
2. Organizational goals—types—structure—effectiveness.
3. Organization and social environment—socio-cultural values; organizational climate.
4. Leadership and organizational policy formation and decision making; theories and patterns of management.
5. Communication and flow of information, motivation, and morale.
6. Organizational change and development.

OR

(D) EDUCATIONAL PSYCHOLOGY AND DEVELOPMENTAL PSYCHOLOGY

Educational Psychology

1. The role and scope of Educational Psychology.
2. Readiness and individual difference in learning:
Factors which determine readiness. The effect of environment deprivation on cognitive development. Individual differences. Appraisal of readiness. Building readiness.
3. Motivational Factors in learning: Motivation for learning. Cognitive drive. Ego enhancement and affiliative components of achievement motivation. Reward & punishment. Drive reduction and reinforcement. Values and Attitudes.
4. Personality factors in learning : Anxiety and school learning. Personality adjustment and school achievement. The personality development and mental health responsibilities of the school.
5. The social psychology of learning : Social climate in learning. Teacher-pupil, and pupil-pupil relations. Other factors in Social climate. The effect of social climate on learning. Motivation of the culturally deprived pupil.
6. School discipline problem: Problems stemming from teacher behaviour. Problems resulting from learning activities.

7. Evaluating learning : Academic achievement tests. Short answer questions. Pitfalls in marking and reporting. Improving marking and reporting practices. Factors of competence in pupil placement.
8. Programmed learning, teaching machines: Automated teaching and individual differences. Possibilities and limitations of programmed self-instruction.

Developmental Psychology

1. Meaning, phases and characteristics of development—Methods of developmental psychology. Biological and socio-cultural factors.
2. Pre-natal development and infancy: Genetic Factors. Hereditary transmission and chromosomal abnormality. Stages. Developmental irregularities. Psychological and physical characteristics of the infant. Methods of studying infant behaviour.
3. Physical, motor and sensory development. Perceptual development.
4. Intellectual development—Development of logical thought in early childhood. Development of concepts. Creativity. Piaget's Theories of Cognitive and Intellectual Development. Effect of deprivation on intellectual development. Development of language and speech. Speech disorders.
5. Emotional Development—patterns, characteristics. Role of maturation and learning. Some common emotional patterns.
6. Social development—Beginning of social behaviour—forms. Socialization, culture and personality—peer influences and family relationships. Formation of self-concept. Development of moral character.
7. Home, school and vocational adjustment of adolescents.
8. Problems of old age and retirement.

19. Public Administration

PAPER I

Administrative Theory

Nature and scope of Public Administration; its role in developed and developing societies ; Development Administrative and Comparative Administration; environmental influences—Social, economic, cultural, political, legal and constitutional.

Evaluation of the science of Public Administration and approaches to its study.

Theories of organisation : concepts of organisation—authority, hierarchy, span of control, unity of command, line and staff, centralisation and decentralisation, delegation and headquarters and field relationships.

The chief executive : role and functions.

Process of management—leadership, decision-making, communication, coordination, supervision and motivation.

Personnel—central personnel agencies, recruitment, training, promotion, employer-employee relations.

Accountability and control—executive, legislative, judicial.

Citizen and administration. Techniques of administrative improvement—O & M, work study, performance budgeting.

PAPER II

Indian Administration

Evaluation of Public Administration in India.

Framework—Constitution, federation, planning, parliamentary democracy.

Political executive at central, state and local levels.

Structure of administration : Secretariat, Field organisations, Boards and Commissions.

Public Services : All India Services, Central Services, State Services, Local Civil Service.

Central personnel agencies—Public Service Commissions.

Procedures of work in government.

Control of public expenditure : role of Finance Ministry, Department/Legislative Committees, Comptroller and Auditor-General.

Machinery for plan formulation at national and state levels.

District administration—role of the district collector.

Local government—rural and urban ; Panchayati Raj.

Public Undertakings—Forms, management and problems.

Relationship between political and permanent executives.

Generalist and specialist in Public Administration.

Corruption in Public Administration.

People's participation in Administration.

Redressal of citizens' grievances.

Administrative reforms.

20. Sociology

PAPER I

Sociology : social stability, social change.

Problems of order and of conflict.

Continuity and change : as fact and as value.

Sociological thought : Marx, Weber, Durkheim, Pareto and their modern interpreters.

Social system : equilibrium, status, role, socialisation, rewards and punishment.

Social conflict : role conflict ; conflict of interests, ideas and values; ideologies ; the dialectics of change.

Power, authority, legitimacy ; types of legitimate authority.

Religion in relation to social solidarity and social conflict.

Economics : social aspects of production, distribution and consumption
Family and kinship.

Sociological theory and empirical research ; research methods in sociology—surveys, questionnaires and interviews ; participant and non-participant observation ; experimentation in sociology ; small group research.

PAPER II

Society and culture in India : unity and diversity; continuity and change.

Approaches to the study of Indian Society : indological, structural-functional, dialectical.

Major groupings : religion, language, caste, tribe.

Major institutions : marriage, family, kinship, division of labour and economic interdependence; decision making, centres of power and political participation ; religion in social, economic and political life.

Social Stratification : traditional concepts of hierarchy : caste and class; the Backward Classes; concepts of equality and social justice in relation to traditional hierarchies; educational and social mobility .

Social Change in Modern India : directed and undirected change ; legislative and executive measures ; social reform ; social movements; urbanization and industrialization associations and pressure groups.

PAPER I

Non-Chordata and Chordata

1. A general survey, classification and relationship of the various phyla.
2. *Protozoa*: Study of the structure, bionomics and life history of *Paramecium*, *Vorticella*, *Monocystis* malarial parasite, *Euglena*, *Trypanosoma* and *Leishmania*.
Locomotion and reproduction in Protozoa.
3. *Porifera*. *Sycon* Canal system and skeleton in *Porifera*.
4. *Coelenterata*. *Obelia* and *Aurelia*: polymorphism in *Hydrozoa* ; coral formation; metagenesis.
5. *Helminths*. *Planaria*. *Fasciola* and *Taenia*. Parasitic adaptation and evolution of parasitism ; *Ascaris*. Helminths in relation to man.
6. *Annelida*. *Nereis*, earthworm and leech ; coelom.
7. *Arthropoda*. *Peripatus*. *Palaemon*. Scorpion *Limulus* cockroach, housefly and mosquito. Larval forms and parasitism in *Crustacea*. Mouth parts, vision and respiration in arthropods; social life and metamorphosis in insects.
8. *Mollusca*. *Unio*, *Pila* and *Sepia*. Pearl formation.
9. *Echinodermata*. Starfish. Larval forms of *Echinodermata*. Interrelationships of invertebrate larvae.
10. Structure and bionomics and classification of the following—
Balanoglossus, *Ascidian*, *Branchiostoma*, Dogfish, bony fish Dipnoi, frog, lizard, bird and mammal.
11. Comparative account of the various systems of vertebrates.
12. Retrogressive metamorphosis;
Paedogenesis; origin of birds; aerial adaptation of birds. integumentary derivatives : adaptations of snakes: poisonous and non-poisonous snakes of India; adaptation of aquatic mammals.

Economic importance of non-chordates and chordates.

Cell Biology Genetics, Physiology, Evolution, Embryology and Histology. Ecology.

1. *Cell Biology*—Structure and function of cell and Cytoplasmic Constituents ; Structure of nucleus, plasma membrane, mitochondria, Golgi bodies, endoplasmic reticulum & ribosomes, Cell division, Mitotic spindle & Chromosome movements.

Gene structure and function : Watson - Crick model of DNA ; replication of DNA Genetic code ; Protein synthesis ; Cell differentiation ; Sex-chromosomes and sex determination.

2. *Genetics* : Mendelian laws of inheritance, Recombination. Linkage and linkage maps. Multiple alleles; Mutation—Natural and induced. Mutation and evolution, Meiosis, Chromosome number and form, Structural rearrangements; polyploidy ; Cytoplasmic inheritance, *Biochemical genetics*, Elements of human genetics—normal and abnormal karyotypes ; genes and isecases Eugenics.

3. *Physiology*—Chemical composition of protoplasm; Chemistry of carbohydrates, proteins, lipids and nucleic acids; Enzymes ; Biological oxidations. Carbohydrate, protein and lipid metabolism ; Digestion and absorption; Respiration ; Circulation of Blood. The Heart—Structure, cardiac cycle, chemical regulation of the heart. Kidney and physiology of excretion. Physiology of muscular contraction: Nerve impulse—Origin and transmission. Function of serisory organs concerned with vision, sound perception, taste, smell and touch. Nutrition with special reference to Man. Physiology of hormones. Physiology of reproduction.

4. *Evolution*—Origin of life. History of evolutionary thought, Lamarck and his works. Darwin and his works. Sources and nature of organic variations. Natural selection: Hardy-Weinberg law; cryptic and warning colouration, mimicry; Isolating mechanisms and their role, *Island life*. Concept of species and sub-species. Principles of classification, Zoological nomenclature and international code. Fossiles. Outline of geological eras. Origin of Amphibia, Aves and Mammals. Phylogeny of horse, elephant, camel. Origin and evolution of man. Principles and theories of continental distribution of animals. Zoogeographical realms of the world.

5. *Embryology and Histology*—Gametogenesis, Fertilization, types of eggs, cleavage. Development up to gastrulation in Branchiostoma frog and chick. Fate maps of frog and chick. Metamorphosis in frog. Formation and fate of extraembryonic membranes in chick. Formation of amnion, allantois and types of placenta in mammals. function of placenta in mammals. Organisers, Regeneration, Genetic control of development. Organogenesis of central nervous system, sense organs, heart and kidney of vertebrate embryos.

Histology of the following tissues and organs of a mammal. Epithelium, connective tissue, blood, lymphoid tissue, bone, cartilage, muscle and nerve, skin, oesophagus, stomach, intestine, rectum, liver. lung, pancreas, spleen, kidney, spinal cord, ovary and testis.

6. *Animal Ecology and Zoogeography*—Concept of Ecosystem : Biogeochemical cycles. Influence of environmental factors on animals, limiting factors. Concepts of habitat and ecological niche.

Energy flow in an ecosystem, food chains, and trophic levels.

Density and population regulation; Intraspecific and Interspecific relationships; competition; predation; parasitism, commensalism, co operation and mutualism.

Major biomes and their communities : Fresh water, marine and terrestrial. Ecological succession.

Wild life of India; Conservation and principles.

Agents of pollution of air, water and land; Effects of pollution on ecosystem. Prevention of pollution.

Principles and theories of continental distribution of animals. Zoogeographical realms.